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Crop Production and Marketing Plans for 1991

You may have already taken steps to carry out your long-run crop plans, but it could be profitable to take a careful look at prices, costs, and the provisions for participation in the feed-grain and wheat programs for 1991 to see if any changes should be made in your 1991 cropping program.

Commodity Programs for Feed Grain and Wheat in 1991

The Food, Agriculture, Conservation, and Trade Act covers crops produced from 1991 to 1995. The requirements to qualify and the payment rates for benefits are presented in Table 1 for feed-grain and wheat crops.

Table 1. Program Provisions and Payment Rates, 1991

	Corn	Sorghum	Barley	Oats	Winter wheat	Other wheat option
Required acreage reduction (percent of base)	7.5	7.5	7.5	0.0	15.0	15.0
Maximum permitted acreage (percent of base)	92.5	92.5	92.5	100.0	85.0	85.0
Normal flexible acreage (percent of base)	15.0	15.0	15.0	15.0	NA	15.0
Maximum payment acreage (percent of base)	77.5	77.5	77.5	85.0	85.0	70.0
Additional optional flex acreage (percent of base)	10.0	10.0	10.0	10.0	NA	10.0
Target price	$2.75	$2.61	$2.36	$1.45	$4.00	$4.00
Basic loan rate	1.89	1.80	1.54	0.97	2.52	2.52
Announced 9-month loan rate	1.62	1.54	1.32	0.83	2.04	2.04
Maximum deficiency payment rate	1.13	1.07	1.04	0.62	1.96	1.96
Deficiency subject to payment limitation	0.86	0.81	0.82	0.48	1.48	1.48
Projected deficiency payment rate	0.58	0.56	0.47	0.15	1.40	1.47
Advance deficiency rate	0.232	0.224	0.124	0.06	0.56	0.588

Recent congressional actions have resulted in the following major changes for the 1991 programs:

1. The 1990 farm bill legislation incorporates the "triple-base" concept to allow more planting flexibility. The term "triple base" comes from the three crop acreage bases: a program acreage base, a permitted acreage base, and a payment acreage base.

   The difference between the program acreage base and the permitted acreage base is the percentage of acreage reduction program (ARP) acres. The Secretary of Agriculture has the discretion to determine the ARP percentage for individual feed grains based on grain stocks. The ARP percentage for corn in 1991 is 7.5 percent. The ARP percentage for wheat for 1991 is 15 percent.

   The difference between the permitted acreage base and the payment base is the acreage on which producers will not receive deficiency payments. Producers are allowed to grow any crop, except fruits and vegetables, on these acres and still maintain base acreage protection. This normal flex acreage is 15 percent of each program crop acreage base.

2. The 1990 legislation permits additional planting flexibility by allowing producers to plant up to 10 percent of their program acreage base to other crops and receive base protection. Deficiency payments will not be paid on these "optional-flex" acres planted to other crops.

3. The method of determining deficiency payment rates remains the same for the 1991 to 1993 crop years as in previous years. Deficiency payments for the 1994 and 1995 crops will be calculated based on a 12-month average price instead of a 5-month average price.

4. For 1991, winter wheat producers will be allowed to choose either the triple-base program provisions or to have their deficiency payments calculated on a 12-month basis.

5. Because of the new act's flexibility features, there are no cross-compliance requirements among program crops.

6. The 1990 farm bill legislation permits 0/92 acres to be planted to minor oilseed crops such as sunflowers, safflower, canola, flaxseed, or others. Hence, producers would be eligible for the projected deficiency payment on 92 percent of payment acreage and would retain protection of program crop acreage base as long as requirement for the set-aside of necessary reduced acres in conservation uses was met. The unpaid 15 percent normal flex acreage could be planted to any crop other than horticultural crops.

In other instances, the general provisions for 1991 are similar to those in previous years. These provisions include those regulations concerning deficiency rate determination, advance deficiency payments, acreage base and program yields, eligibility requirements for land set aside for acreage conservation reserve (ACR), payment eligibility and payment limitation, as well as penalties for failure to comply with program requirements.

Wheat and feed-grain program sign-up will begin March 4, 1991, and continue through mid-April. Specific requirements to qualify for program benefits for crop grown on your farm will be available from your county ASCS office.

Comparing Crop Alternatives

To help you select crop combinations that will optimize net crop returns, the contributions of individual crops at average expected yields, prices, and costs are presented in Table 2. The "net return over variable cost" row in Table 2 shows the marginal effects of acreage shifts on crop income. For instance, the net return of $190 over variable costs from a 14? bushel rotated corn crop sold at harvest for $2.30 per bushel is slightly less than the net return of $198 for a 45-bushel soybean crop sold at harvest for $6 per bushel if you are not participating in the reduced acreage program for corn or if you are evaluating what to grow on the normal 15 percent flex acres in the program.

Similarly, in evaluating possible participation in 1991 program alternatives for corn, you should compare the expected net returns from producing one acre of corn if you don't

Table 2. Estimated Costs and Returns per Acre for Producing Selected Crops in Illinois in 1991

	Wheat			Oats	Canola		Sunflower			Mixed alfalfa hay
Production	70 bu	54 bu	40 bu	80 bu	45 bu	30 bu	25 cwt	20 cwt	15 cwt	4.5 T
Harvest price	$2.60	$2.60	$2.60	$1.10	$5.00	$5.00	$9.00	$9.00	$9.00	$ 50
Gross returns	$182	$140	$104	$ 88	$225	$150	$225	$180	$135	$225
Variable costs:										
Seed	$ 12	$ 10	$ 8	$ 8	$ 20	$ 15	$ 11	$ 10	$ 9	$ 9
Pesticides	4	2	1	1	1	1	32	27	24	7
Fertilizer										
N	22	18	14	11	30	25	20	14	10	--
P, K, lime	22	18	14	11	24	20	20	14	10	50
Machinery, repair, and fuel	18	17	16	14	20	18	22	21	20	30
Drying fuels and repair	--	--	--	--	--	--	--	--	--	--
Interest on operating capital	5	4	4	3	5	4	6	5	4	4
Total variable costs	$ 84	$ 69	$ 57	$ 48	$100	$ 84	$111	$ 90	$ 77	$100
Returns above variable costs	$ 98	$ 71	$ 47	$ 40	$125	$ 66	$114	$ 90	$ 58	$125
Other costs:										
Machinery depreciation and interest	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 50
Labor	11	10	9	10	11	10	11	10	9	30
Management	11	8	6	5	11	7	11	9	7	14
Storing (int. and bin)	17	13	9	11	14	10	15	12	9	34
Miscellaneous	15	15	15	15	15	15	15	15	15	12
Total other costs	$ 84	$ 76	$ 69	$ 71	$ 81	$ 72	$ 82	$ 76	$ 70	$140
Land costs (cash rent)	$130	$100	$ 60	$ 60	$100	$ 60	$130	$100	$ 60	$100
Total all costs										
per acre	$298	$245	$186	$179	$281	$216	$323	$266	$207	$340
per bushel	$4.26	$4.54	$4.65	$2.24	$6.24	$7.20	$12.92	$13.30	$13.80	$75.55

Table 2. Estimated Costs and Returns Per Acre for Producing Selected Crops in Illinois in 1991 (continued)

	Rotated corn			Second-year corn	Grain sorghum	Soybeans			Double-crop soybeans	Set-aside cover crop
Production (bu)	175	145	115	130	120	57	45	33	20	--
Harvest price	$2.30	$2.30	$2.30	$2.30	$2.15	$6.00	$6.00	$6.00	$6.00	--
Gross returns	$402	$333	$264	$299	$258	$342	$270	$198	$120	--
Variable costs:										
Seed	$ 24	$ 21	$ 18	$ 21	$ 6	$ 13	$ 10	$ 9	$ 15	$ 4
Pesticides	20	17	15	34	15	22	20	18	25	--
Fertilizer										
N	34	30	26	30	25	--	--	--	--	--
P, K, lime	28	24	20	22	22	19	17	15	8	4
Machinery, repair, and fuel	26	25	24	25	24	22	21	20	12	7
Drying fuels and repair	22	18	15	16	17	--	--	--	--	--
Interest on operating capital	9	8	7	8	6	4	4	4	3	1
Total variable costs	$163	$143	$125	$156	$114	$ 80	$ 72	$ 64	$ 63	$ 16
Return above variable costs	$239	$190	$139	$143	$144	$262	$198	$134	$ 57	- 1
Other costs:										
Machinery depreciation and interest	$ 40	$ 40	$ 40	$ 40	$ 38	$ 36	$ 36	$ 36	$ 20	$ 20
Labor	22	21	20	21	20	20	19	18	10	7
Management	20	17	13	15	14	18	14	10	6	--
Storing (int. and bin)	34	28	22	25	22	23	17	13	8	--
Miscellaneous	15	15	15	15	15	15	15	15	8	8
Total other costs	$131	$121	$110	$116	$109	$112	$101	$ 92	$ 52	$ 35
Land costs (cash rent)	$130	$100	$ 60	$100	$100	$130	$100	$ 60	--	$100
Total all costs										
per acre	$424	$364	$295	$372	$323	$322	$273	$216	$115	$151
per bushel	$2.42	$2.51	$2.56	$2.86	$2.69	$5.65	$6.07	$6.54	$5.75	$ --

ırticipate with the net returns from the mposite corn-acre base of 0.925 acre devoted corn production and 0.075 acre in ACR set-ide. Then compare those returns with the turns from raising the normal flex 15 per-nt of permitted acreage in soybeans or other ops alternative, including production of 775 acre of corn, 0.150 acre of soybeans, and 075 acre in ACR set-aside. Finally, evaluate e 0-92 participation alternative, in which up 100 percent of the base is put into soil-nserving crops or selected eligible oilseed ops such as sunflower or canola are raised ı the 0-92 acreage. These comparisons are lustrated in Tables 3 and 4.

/ith January harvest delivery prices of $2.30 r corn with an estimated $0.40 target price eficiency payment and $2.60 for wheat with $1.10 and $1.20 deficiency rate, participa-on in feed-grain and wheat programs give reater net returns for producers with typical ield and cost relationships. The advantage r participation is $22 per acre for corn ($212 ersus $190) and $29 for wheat ($100 versus 71). Participation in the other wheat triple ase program with a lower payment base has lower return than that from the original rogram ($100 versus $95).

'he market price necessary for net crop eturns to be equal for participation and onparticipation can be calculated by dividing he sum of value of program crop production n permitted acres plus net production cost avings on idled acres by the bushels of rogram crop production on base acreage. Vith the data used in the crop return omparisons in Tables 3 and 4, the break-ven price is approximately $2.50 per bushel or corn and $3.40 for wheat.

'he substitution of soybeans on the normal 15 ercent flex acreage increased net return lightly, while the substitution of soybeans on he optional 10 percent flex corn base lowered iet returns from the crop base acre at the evel of prices, costs, and yields used in Table . With higher soybean prices and/or lower xpected corn yields, substitution of soybeans nay appear attractive for both alternatives. 'his would be true of a farm with the major ortion of the tillable crop land in the corn ase, and corn yields would be less on the ontinuous corn acreage.

When expected yields are at normal program production levels, participation in the optional 0-92 land diversion results in much lower net returns than any of the other alternatives for using the corn or wheat base acreage. However, owner-operators who can plant and harvest high enough yields of one of the eligible minor oilseed crops may find participation in the 0-92 option profitable as shown by the example for canola on wheat base in Table 4.

Participation in the 1991 feed-grain and wheat programs can affect farm returns in several ways, depending upon several factors that may vary with different situations. Three major factors are (1) expected market prices, (2) expected yields, and (3) the extent to which expenditures can be reduced by idling acres. Other factors include the yield levels that form the basis for payments for idled acres, the importance of advance payments and participation in the commodity loan program in meeting cash flow needs, and the availability of other profitable nonprogram crop production opportunities. In the case of wheat, the effect of participation on the amount of double-crop and straw production is another factor.

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Table 3. Comparison of Crop Returns per Acre for Alternate Program Participation Options for Corn

	Acres	Production on base	Harvest price or rate per unit	Crop return or payment	Variable cost[1]	Net return over variable cost
Not participate, rotated corn	1.0	145 bu	$2.30	$333.50	$143.00	$190.50
Participate						
Corn (145-bu yield)	0.925	134.1	2.30	308.49	132.28	
ACR (deficiency for 0.775 A)[2]	0.075	93.0[2]	0.40[3]	37.20	1.50	
Composite base acre	1.0			345.69	133.78	211.91
Participate, soybeans on 15 percent						
Corn (145-bu yield)	0.775	112.38	2.30	258.46	110.82	
Soybeans (45-bu yield)	0.150	6.75	6.00	40.50	10.80	
ACR (deficiency for 0.775 A)	0.075	93.0[2]	0.40[3]	37.20	1.50	
Composite base acre	1.0			336.16	123.12	213.04
Participate, soybeans on 25 percent						
Corn (145-bu yield)	0.675	97.88	2.30	225.11	96.51	
Soybeans (45-bu yield)	0.250	11.25	6.00	67.50	18.00	
ACR (deficiency for 0.675 A)[2]	0.075	81.0[2]	0.40[3]	32.40	1.50	
Composite base acre	1.0			325.01	116.01	209.00
Participate whole base, 0-92 option						
All acres in conservation use (CU) crops						
Corn	0.0	--	--	--	--	
ACR set-aside	0.075	--	--	--	1.50	
Optional CU	0.212	--	--	--	4.24	
CU diversion for pay	0.713	85.56[2]	0.58[4]	49.62	14.26	
Composite base acre	1.0			49.62	20.00	29.62
Acres in eligible oilseed crops						
Corn	0.0					
ACR set-aside (def. on 0.713)[2]	0.075	85.56[2]	0.58[4]	49.62	1.50	
Soybeans on normal 15 percent flex (45-bu yield)	0.150	6.75	6.00	40.50	10.80	
8 percent optional CU and diversion for pay						
Minor oilseed (sunflower) (20-cwt yield)	0.775	15.50 cwt	9.00	139.50	69.75	
Composite base acre	1.0			229.62	82.05	147.57

[1] Includes seed, pesticides, fertilizer, machinery repairs and fuel, drying costs, and interest on operating capital only.

[2] Quantity for payment is program yield times acres eligible for pay. Assume ASCS program yield of 120 bushels for corn.

[3] Estimated ASCS target price deficiency rate ($2.75-$2.35 five-month average).

[4] ASCS projected target prices deficiency payment rate for 0-92.

Table 4. Comparison of Crop Returns per Acre for Alternate Program Participation Options for Wheat

	Acres	Production on base (bu)	Harvest price or rate per unit	Crop return or payment	Variable cost[1]	Net return over variable cost
Not participate	1.0	54	$ 2.60	$140.40	$ 69.00	$ 71.40
Participate, original program						
Wheat (54-bu yield)	0.85	45.9	2.60	119.34	58.65	
ACR (deficiency for 0.85 A)[2]	0.15	38.25[2]	1.10[3]	42.08	3.00	
Composite base acre	1.0			161.42	61.65	99.77
Participate, triple-base program						
Wheat (54-bu yield)	0.85	45.90	2.60	119.34	58.65	
ACR (Deficiency on 0.7 A)[2]	0.15	31.50[2]	1.20[4]	37.80	3.00	
Composite base acre	1.0			157.14	61.65	95.49
Participate, triple-base program, 15 percent soybeans on normal flex acres						
Wheat (54-bu yield)	0.70	37.80	2.60	98.28	48.30	
ACR (deficiency on 0.7 A)[2]	0.15	31.50[2]	1.20[4]	37.80	3.00	
Soybeans (33-bu yield)	0.15	4.95	6.00	29.70	9.60	
Composite base acre	1.0			165.78	60.90	104.88
Participate, triple-base program, 25 percent soybeans on normal and optional flex acres						
Wheat	0.6	32.4	2.60	84.24	41.40	
ACR (Deficiency on 0.6 A)[2]	0.15	27.0[2]	1.20[4]	32.40	3.00	
Soybeans (33-bu yield)	0.25	8.25	6.00	49.50	16.00	
Composite base acre	1.0			166.14	60.40	105.74
Participate in 0-92						
Original program, all acres in CU						
Wheat	0.00	--	--	--		
ACR	0.15	--	--	--	3.00	
Optional CU (8 percent)	0.068	--	--	--	1.36	
CU diversion for pay	0.782	35.19[2]	1.40[5]	49.27	15.64	
Composite base acre	1.0			49.27	20.00	29.27
Triple-base program w/acres in eligible oilseeds						
Wheat	0.0	--	--	--		
ACR (deficiency on 0.644 A)[2]	0.15	28.98[2]	1.47[5]	42.60	3.00	
Normal flex acres in soybeans (33-bu yield)	0.15	4.95	6.00	29.70	9.60	
8 percent optional CU and diversion for pay in canola (30-bu yield)	0.70	21.0	5.00	105.00	58.80	
Composite base acre	1.0			177.30	71.40	105.90
Wheat and double-crop soybeans						
Not participate	1.0			260.40	132.00	128.40
Participate, original program						
Composite base acre	1.0			263.40	115.20	148.20
Participate, triple-base program						
Composite base acre	1.0			259.20	105.20	144.00

[1] Includes seed, pesticides, fertilizer, machinery repairs and fuel, drying costs, and interest on operating capital only.
[2] Quantity for payment is program yield times acres eligible for pay. Assumes ASCS program yield of 45 bushels for wheat.
[3] Estimated ASCS target prices deficiency payment rates for 12-month average ($4.00 to $2.90).
[4] Estimated ASCS target prices deficiency payment rates for 5-month average ($4.00 to $2.80).
[5] ASCS projected target deficiency for 0-92 is $1.40 for original program and $1.47 for triple base.

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The Projected Financial Condition of Illinois Cash-Grain Farms, 1991-1994

The economic outlook for Illinois cash-grain farms for the 1990s is mixed. Iraq's recent invasion of Kuwait and threats of conflict in the Middle East have sent oil prices soaring to around $35 per barrel. In turn, fuel, fertilizer, chemicals, and many other products used on farms will likely increase in price by spring 1991 planting. The 1990 Farm Bill has been passed, and the federal government has slashed over 14 billion dollars from the agriculture budget over the next five years to help reduce the federal budget deficit. Target prices are frozen at their previous level; however, the potential per-acre payment to farmers has been reduced. Higher production costs coupled with lower deficiency payments for program crops may slow the rate of increase in Illinois land values and rents, especially on farmland that is of marginal quality.

Four-Year Projections and Assumptions

This report projects the financial performance of four northern and central and four southern Illinois cash-grain farms of various sizes under a given set of commodity prices and production costs. Table 1 illustrates the commodity prices and farm program assumptions made by the authors for this report. The Illinois Farm Business Farm Management (FBFM) record-keeping system is the source of information on average farm sizes and costs for Illinois cash-grain farms.

Table 1. Commodity Prices Used to Project the Financial Condition of Illinois Cash-Grain Farms Over the Next Four Years

Commodity	Dollars per bushel
Corn	
Target price	$2.75
Cash price	2.25
Deficiency	0.50
Set-aside	7.5 to 10%
Soybeans	
Cash price	6.15
Wheat	
Target price	4.00
Cash price	3.25
Deficiency	0.75
Set-aside	15%

Other assumptions include interest rates held constant at 10.5 percent for real estate loans and at 11 percent for operating and machinery loans. Cash balances over $10,000 are invested at an 8 percent annual rate of return. Family living expenses are assumed to be $20,865 for a family of four with $2,250 of income placed into a retirement account if income is sufficient. The $20,865 family living expense figure represents the FBFM average of the lower third of farms that accounted for all sources and uses of funds in 1989. Production costs are held constant for the four-year period as higher oil prices have already been factored into 1991 production costs. The authors increased crop production costs $4 per acre for 1991 while decreasing farm program payments 14 percent or $4 per tillable acre. Crop yields are projected to increase 1 percent per year unless otherwise stated. Other costs such as machinery purchases, family living expenses, and miscellaneous expenses rise 2 percent per year. Land values and nonfarm income appreciate 3 percent per year while used machinery depreciates 10 percent per year.

Two initial debt-to-asset (D/A) ratio assumptions are presented for each farm--one at 20 percent to reflect a moderate level of debt and one at 50 percent to reflect a relatively high leverage position. Net farm income and many other financial ratios are presented for these case farms over the next four years. Farmers and their advisers can utilize this information in evaluating the future financial performance of their farm businesses.

Northern and Central Illinois Cash-Grain Farms

The yields for corn and soybeans are assumed to be 140 and 44 bushels, respectively, for the northern and central Illinois cash-grain farms. The county Agricultural Stabilization and Conservation Service (ASCS) yield is 130 bushels for corn. Set-aside for corn is 7.5 percent in 1991 and 10 percent in the following years. However, program payments are based upon only 77.5 percent of the corn base. The crop mix is 53 percent corn base and 47 percent soybeans. Corn is planted on 92.5 percent of the corn base in 1991 and 90 percent is planted in subsequent years. Each of the four farms owns 270 tillable acres valued at $2,000 per acre. The balance of the acreage is rented on a 50-50 crop share lease with the landlord paying one-half of the fertilizer, chemical, and seed expenses.

Table 2 illustrates the acreage, tenure position, capital expenditures, off-farm income, and an operator labor charge for each of the Capital purchases for machinery reflect the 1989 average of FBFM participants with the given amount of acreage. Nonfarm income averaged $10,500 for all FBFM cooperators who accounted for sources and uses of funds in 1989. The operator labor charge is calculated by taking $1,250 times the number of operator labor months. The differences in capital expenditures, nonfarm income, and the labor charge reflect the size of the operation.

Results of Northern and Central Illinois Farms with a 20 Percent D/A Ratio

Table 3 illustrates the results of the four-year projection for the northern and central Illinois cash-grain farms with a 20 percent D/A ratio. Net farm income, net after-tax income, percent return on equity (ROE), cash balance, market value net worth, cost basis net worth, and the D/A ratio are given for each of the case farms. Each farm starts with an initial cash balance of $10,000 and a D/A ratio of 20 percent. Net after-tax income consists of the earnings from the farm business plus nonfarm income less federal, state, and social security taxes. The ROE percentage is calculated by taking net farm income less an unpaid operator labor charge and dividing that figure by the average of the beginning and ending market value net worths.

Net farm income ranges from $19,000 to $21,000 for the 270-acre grain farm with a 20 percent D/A ratio during the four-year period. Farm income increases over time as interest expense declines. Net after-tax income, which includes $21,000 of nonfarm income, ranges from $33,000 to $35,000. The ROE percentage remains near the 2.5 percent level for the four-year period. The cash balance falls to $6,000 at the end of the fourth year. A positive cash balance means a farm can meet its loan obligations and family living expenses in a timely manner. Market value net worth increases considerably due to the 3 percent annual increase in land values and the earnings from the farm and nonfarm sources. Cost basis net worth also shows modest gains. The D/A ratio declines from 20 to 13 percent by 1994.

Table 2. Economic Factors Associated with Northern and Central Illinois Grain Operations of Various Sizes

	270 acres	540 acres	927 acres	1,490 acres
Tillable acres	270	540	927	1,490
Acres rented	0	270	657	1,220
Percentage of land owned (tenure)	100%	50%	29%	18%
	---Annual---			
Capital purchases	$11,500	$13,000	$26,500	$41,000
Off-farm income	$21,000	$10,500	$5,250	$0
Operator labor charge	$7,500	$15,000	$20,000	$30,000

Table 3. Projected Financial Position of Northern and Central Illinois Cash-Grain Farms with a 20 Percent D/A Ratio

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
270 acres							
Initial				10,000	556	376	0.20
1991	19,756	32,906	2.45	11,369	582	389	0.19
1992	19,882	33,424	2.41	8,294	610	402	0.17
1993	20,202	33,899	2.36	7,220	640	416	0.15
1994	21,170	34,903	2.43	5,840	671	430	0.13
540 acres							
Initial				10,000	599	398	0.20
1991	34,263	33,970	3.50	14,010	625	412	0.19
1992	35,164	35,093	3.54	12,979	655	427	0.17
1993	36,093	35,771	3.52	11,238	687	442	0.15
1994	38,110	36,988	3.64	9,486	720	458	0.13
927 acres							
Initial				10,000	662	436	0.20
1991	46,905	37,347	4.33	14,239	694	453	0.19
1992	47,240	37,834	4.21	11,726	729	471	0.17
1993	47,846	38,094	4.06	8,026	765	488	0.14
1994	49,676	39,314	4.08	7,199	802	507	0.12
1,490 acres							
Initial				10,000	750	490	0.20
1991	67,043	47,453	5.16	24,242	795	517	0.19
1992	68,570	49,292	5.17	29,353	843	546	0.16
1993	69,551	50,251	5.01	32,933	893	576	0.14
1994	70,682	51,230	4.86	37,031	945	606	0.11

Net farm income is projected to be between $34,000 and $38,000 for the 540-acre grain farm with net after-tax income slightly lower. The ROE percentage stays at the 3 to 4 percent level when a $15,000 operator labor charge is subtracted from net farm income. The cash balance stays near the initial $10,000 level with annual capital purchases of $13,000. Market value net worth increases $120,000 while cost basis net worth increases $60,000. The D/A ratio, calculated on the market value balance sheet, declines to 13 percent.

Net farm income is slightly less than $50,000, while net after-tax income is just less than $40,000 for the 927-acre grain farm. The ROE percentage is above 4 percent. Market value net worth increases due to land appreciation, net earnings, and debt reduction. Cost basis net worth benefits from net earnings and debt reduction.

Net farm income ranges from $67,000 to $71,000, while after-tax income ranges from $47,000 to $51,000 for the 1,490-acre grain farm. The ROE percentage is over 5 percent when a $30,000 nonpaid operator labor charge is considered. The cash balance climbs to $37,000 and the market value net worth increases nearly $200,000. The level of debt declines as reflected by the falling D/A ratio.

Under the present assumptions, each of the four northern and central Illinois cash-grain farms with a 20 percent D/A ratio will make financial progress over the next four years with higher production costs and lower farm program payments. Cost basis net worth improves while the D/A ratio declines for this group of farms. However, the ROE percentage remains below the 6 percent level when an operator labor charge is subtracted. The gains in market value net worth are primarily from appreciating land values. Also, the nonfarm income for the smaller farms is quite helpful in meeting all family living expenses and debt obligations. The larger farms are not as dependent upon outside income, but their income levels are influenced more by changes in crop yields, prices, or costs than the smaller farming operations.

Results of Northern and Central Illinois Farms with a 50 Percent D/A Ratio

Table 4 illustrates the results of the four-year projection for the northern and central Illinois cash-grain farms with a 50 percent D/A ratio. Capital purchases for the farms with a 50 percent D/A ratio are only half the amount listed for the farms with a 20 percent D/A ratio except for the largest grain farm. Other assumptions concerning costs, yields, and prices remain the same.

Net farm income ranges from -$1,000 to $1,000 for the 270-acre cash-grain farm with a 50 percent D/A ratio. Net after-tax income averages $20,000 when $21,000 of nonfarm income is included. The ROE percentage remains negative, meaning that farm earnings do not cover the unpaid labor charge. The cash balance falls below $0 to -$17,000. A negative cash balance can be interpreted as an operating loan that is carried over from one year to the next. Market value net worth increases as land values rise and total debt declines, but the cost basis net worth declines somewhat. A declining cost basis net worth means earnings will not be sufficient to meet all capital requirements of the farm business.

Net farm income ranges from $11,000 to $15,000 for the 540-acre grain farm. Net farm income increases over the four-year period as interest and depreciation expenses decline. Net after-tax income averages $20,000, but the ROE percentage is near zero. The cash balance falls below $0 by 1993. Market value net worth rises due to asset appreciation and debt reduction while the cost basis net worth remains the same.

The 927-acre grain farm's net farm earnings and net after-tax income reach the mid-$20,000 level. The ROE percentage remains below 2 percent and the cash balance is positive. Market and cost basis net worth increase over the four-year period. A strengthening financial position is also reflected by the falling D/A ratio.

Net farm income averages $37,000 for the 1,490-acre farm with a 50 percent D/A ratio. The ROE percentage remains below 2 percent while the cash balance remains positive.

Table 4. Projected Financial Position of Northern and Central Illinois Cash-Grain Farms with a 50 Percent D/A Ratio

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
270 acres							
Initial				10,000	349	169	0.50
1991	-1,094	18,426	-2.50	6,393	360	168	0.49
1992	-714	19,082	-2.32	-206	374	166	0.47
1993	739	20,512	-1.83	-6,857	388	166	0.47
1994	727	20,862	-1.78	-17,172	405	165	0.46
540 acres							
Initial				10,000	375	175	0.50
1991	11,718	18,528	-0.75	7,862	385	173	0.49
1992	12,773	19,489	-0.50	2,830	400	172	0.48
1993	14,641	21,001	-0.03	-2,570	415	172	0.47
1994	15,137	21,606	0.03	-11,337	433	173	0.45
927 acres							
Initial				10,000	416	190	0.50
1991	23,436	22,037	1.08	6,132	430	192	0.49
1992	25,211	23,307	1.40	9,939	451	195	0.47
1993	27,731	25,075	1.85	4,907	470	199	0.46
1994	28,725	25,828	1.91	3,091	495	204	0.43
1,490 acres							
Initial				10,000	471	209	0.50
1991	37,643	27,613	1.89	6,426	496	217	0.48
1992	36,950	27,150	1.57	4,244	523	224	0.47
1993	35,402	26,118	1.10	2,311	550	229	0.45
1994	37,583	27,573	1.41	1,671	578	236	0.44

Market and cost basis net worth increase and the D/A ratio declines. This 1,490-acre farm is able to make the same level of capital purchases as the 1,490-acre farm with a 20 percent D/A ratio. Although this farm has a large debt load, the farm is able to handle this level of debt better than the smaller farms due to the number of acres operated and the low tenure position.

The northern and central Illinois grain farms with a 50 percent D/A ratio will maintain their financial position over the next four years. However, each farm's earnings are low due to their high leveraged position. Furthermore, nonfarm income is essential to meet all loan obligations and family living expenses for the smaller operations. Although these farms' returns are low, the farms are able to reduce their level of debt and continue farming. In the future, the smaller farms will need to make large capital purchases as their present farm machinery wears out. Also, further increases in production costs or decreases in farm program payments will affect this group of farms more negatively than farms with a 20 percent D/A ratio.

Southern Illinois Cash-Grain Farms

Yields for southern Illinois farmland are more volatile than northern and central Illinois farmland yields. Table 5 illustrates corn, soybean, and wheat yields for southern Illinois cash-grain farms for the four-year period. We will consider 1993 a drought year with reduced corn and soybean yields. On average, the corn, soybean, and wheat yields are assumed to be 120, 36, and 50 bushels per acre, respectively. The county ASCS yields are 110 bushels for corn and 45 bushels for wheat. The target price for wheat is $4.00 with a 15 percent set-aside requirement. However, the program payments will be calculated on 77.5 percent of the wheat base acres after 1991.

Table 5. Projected Yields for Southern Illinois Cash-Grain Farms in Bushels per Acre

Commodity	1991	1992	1993	1994
Corn	125	130	100	127.5
Soybeans	38	40	30	39.0
Wheat	50	51	52	53.0

The crop mix is approximately 42 percent corn base, 38 percent soybeans, and 20 percent wheat base. Again, corn is planted on 92.5 percent of the corn base in 1991 and on 90 percent in subsequent years. Wheat is planted on 85 percent of the wheat base in each year. Each of the four farms owns 256 tillable acres valued at $1,200 per acre. The balance of the acreage is rented on a 60-40 crop-share lease with the landlord paying 40 percent of the fertilizer and chemical expenses. Costs of production reflect the 1989 averages of southern Illinois farmers participating in the FBFM record-keeping system. Prices received are the same as the northern and central Illinois farms.

Table 6 illustrates the acreage, tenure position, capital expenditures, off-farm income, and an operator labor charge for each of the four southern Illinois farms. Again, the differences in capital expenditures for machinery, off-farm income, and the nonpaid labor charge reflect the size of the operation.

Results of Southern Illinois Farms with a 20 Percent D/A Ratio

Table 7 illustrates the results of the financial projections for the southern Illinois cash-grain farms with a 20 percent D/A ratio. Net farm income ranges from $16,000 to $19,000 in the nondrought years. Net after-tax income averages near $30,000 for the 256-acre grain farm over the four-year period. The ROE percentage is low with a 3 percent return on net worth. The cash balance remains positive, meaning the farm can meet its debt obligations and family living expenses in a timely manner. Market value net worth rises to $420,000, and the cost basis net worth increases $38,000.

Farm earnings and net after-tax income surpass the $30,000 level for the 532-acre grain farm in the nondrought years. The percent ROE reaches 5 percent and the cash balance increases to $18,000 in 1992. In 1993, net accrual farm income falls to $13,000 due to the lower yields and inventories. In turn, the ROE percentage and the cash balance fall due to the lower earnings. Market value net worth increases throughout the four-year period as land appreciates. Cost basis net worth only increases in the nondrought years. The market value D/A ratio declines to 15 percent by 1994.

Net farm income averages $36,000 and net after-tax income averages $31,000 for the 879-acre grain farm. The ROE percentage reaches 6 percent before the drought year. The cash balance remains near its initial level of $10,000. Market value net worth rises to $514,000 from $438,000, while the cost basis net worth rises to $325,000 from $283,000.

Farm earnings reach $64,000 in 1992 and fall to $10,000 the following year for the 1,589-acre grain farm. The ROE percentage averages 5.60 percent for the three years with good yields, but the percentage turns negative during the drought year. For the four-year

Table 6. Economic Factors Associated with Southern Illinois Grain Operations of Various Sizes

	256 acres	532 acres	879 acres	1,589 acres
Tillable acres	256	532	879	1,589
Acres rented	0	276	623	1,333
Percentage of land owned (tenure)	100%	48%	29%	10%
	Annual			
Capital purchases	$9,700	$12,400	$19,600	$41,000
Off-farm income	$21,000	$10,500	$5,250	$0
Operator labor charge	$7,500	$15,000	$20,000	$30,000

Table 7. Projected Financial Position of Southern Illinois Cash-Grain Farms with a 20 Percent D/A Ratio

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
256 acres							
Initial				10,000	346	248	0.20
1991	16,954	31,039	3.23	12,011	365	259	0.19
1992	18,537	32,569	3.62	14,846	386	271	0.17
1993	5,403	23,941	-0.23	13,817	399	275	0.15
1994	16,580	32,092	2.83	14,538	420	286	0.14
532 acres							
Initial				10,000	392	262	0.20
1991	30,670	31,574	4.54	12,535	411	273	0.19
1992	34,241	34,294	5.31	18,428	433	287	0.17
1993	13,022	20,298	-0.18	16,146	441	287	0.15
1994	32,303	33,593	4.50	17,800	463	300	0.15
879 acres							
Initial				10,000	438	283	0.20
1991	42,078	34,756	5.58	9,675	460	298	0.19
1992	46,587	37,250	6.33	16,140	485	315	0.17
1993	14,172	16,435	-1.12	8,765	490	310	0.15
1994	42,127	35,004	4.90	9,407	514	325	0.15
1,589 acres							
Initial				10,000	543	353	0.20
1991	57,308	40,735	5.39	11,195	578	374	0.18
1992	64,133	45,511	6.24	22,620	618	399	0.16
1993	10,351	9,556	-3.25	10,642	621	387	0.13
1994	58,381	41,511	4.73	12,611	656	409	0.13

period, market value and cost basis net worths still increase as the level of debt and the D/A ratio decline.

The southern Illinois grain farms with a 20 percent D/A ratio will make financial progress in years with good yields, but will suffer financially during a drought year. Overall, these farms are projected to increase their financial positions over the next four years with the given yields, farm program payments, and cost structure. Reduced yields are more financially devastating to the larger farming operations than the smaller operations in terms of reductions in income. The smaller farming operations have nonfarm income to help offset cash requirements in poorer years.

Results of Southern Illinois Farms with a 50 Percent D/A Ratio

Table 8 illustrates the results of the financial projections for the southern Illinois cash-grain farms with a 50 percent D/A ratio. Capital purchases for the farms with a 50 percent D/A ratio are only one-half of the amount listed for the farms with a 20 percent D/A ratio except for the largest grain farm.

Table 8. Projected Financial Position of Southern Illinois Cash-Grain Farms with a 50 Percent D/A Ratio

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
256 acres							
Initial				10,000	216	118	0.50
1991	3,041	21,352	-2.07	2,602	225	119	0.49
1992	5,991	23,664	-0.46	7,706	237	122	0.47
1993	-6,211	14,926	-6.66	6,234	240	116	0.47
1994	4,678	23,498	-1.16	4,598	253	118	0.45
532 acres							
Initial				10,000	245	115	0.50
1991	16,755	21,887	1.18	8,216	254	117	0.49
1992	20,901	24,825	2.90	9,938	266	121	0.47
1993	373	11,081	-6.41	3,869	265	111	0.46
1994	19,745	24,408	2.07	4,183	277	114	0.46
879 acres							
Initial				10,000	276	121	0.50
1991	27,013	24,424	3.19	7,236	287	125	0.48
1992	32,664	28,279	5.11	8,355	304	133	0.46
1993	1,986	7,041	-6.91	3,217	299	119	0.45
1994	30,245	26,843	3.75	2,879	315	125	0.44
1,589 acres							
Initial				10,000	339	149	0.50
1991	43,203	30,916	4.52	8,961	356	160	0.49
1992	45,469	32,256	4.79	9,366	378	172	0.47
1993	-10,423	-10,423	-12.47	7,135	358	140	0.49
1994	33,049	24,144	0.65	5,991	373	143	0.50

Net farm income is positive in the nondrought years and negative in the drought year for the 256-acre grain farm. Net after-tax income ranges from $15,000 to $24,000 after $21,000 of nonfarm income is considered. The ROE ratio remains negative, but the cash balance remains positive at $5,000. Market value net worth increases while the cost basis net worth remains the same. The D/A ratio declines to 45 percent from the initial level of 50 percent.

Net farm income ranges from $0 to $21,000 and net after-tax income ranges from $11,000 to $25,000 for the 532-acre grain farm. The ROE percentage ranges from 1 to 3 percent in nondrought years while the cash balance falls to $4,000. Market value net worth increases due to land appreciation, but the farm and nonfarm earnings are not sufficient to increase the cost basis net worth for the four-year period.

Net farm income reaches $32,000 in 1992 but falls to $2,000 in the following year for the 879-acre grain farm. Net after-tax income averages just over $20,000 during the four-year period. Market value net worth increases $40,000 over the four-year period, but the cost basis net worth increases only $4,000.

Accrual farm income for the 1,589-acre grain farm falls below $0 during the drought year. The ROE percentage also reflects the years with good and poor yields. The cash balance remains positive with the same level of capital purchases as the 1,589-acre farm with a 20 percent D/A ratio. Prior to the drought year, both the market and the cost basis balance sheet increase. For the four-year period, the market value net worth increases, but the cost basis net worth declines.

The southern Illinois farms with a 50 percent D/A ratio will improve their financial position with good crop yields; however, a drought year will set this group of farms back more than the farms with a 20 percent D/A ratio due to their high leverage position. Overall, these farms will maintain their financial position under the given economic scenario of higher production costs and lower farm program payments.

Conclusion

The economic scenarios presented here were developed using the Farm Business and Financial Management Transition Planning Model. The results are based upon the authors' price, yield, and farm program assumptions, and the FBFM cost and size averages for 1989. The model can easily be applied to specific farms or to assumptions that differ from those used in this newsletter.

For more information on the topics discussed in this newsletter, contact Kevin Koenigstein at (217)333-0479. The Transition Program is available through the IlliNet office at (217)244-5956.

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The Projected Financial Condition of Illinois Livestock Farms, 1991-1994

Illinois swine and dairy producers found 1990 a very good year. Market hog prices cleared the $60 per cwt level for much of the summer before falling below $50 per cwt by year's end. Milk prices topped the $15 per cwt level in 1990 before falling to $11 per cwt by the end of the year. As we enter 1991, livestock producers share many concerns with grain producers. The federal government has slashed 14 billion dollars from the agriculture budget over the next five years to help reduce the federal budget deficit. Higher oil prices translate into higher costs of production for crop production as well as for livestock production. Although swine and dairy operations were generally profitable in 1990, their profitability in years to come may decline due to herd expansions and reductions in consumer demand for pork and dairy products.

Four-Year Projections and Assumptions

This report projects the financial performance of swine and dairy operations in northern, central, and southern Illinois under a given set of commodity prices and production costs. Table 1 illustrates the commodity prices and farm program assumptions made by the authors for the next four years. The Illinois Farm Business Farm Management (FBFM) record-keeping system is the source of information on average farm sizes and costs for Illinois livestock operations.

Table 1. Commodity Prices Used to Project the Financial Condition of Illinois Livestock Farms for 1991-1994

Commodity	Price
	----dollars per bushel----
Corn	
Target price	$2.75
Cash price	2.25
Deficiency	0.50
Set-aside	7.5 to 10%
Soybeans	
Cash price	6.15
Wheat	
Target price	4.00
Cash price	3.25
Deficiency	0.75
Set-aside	15%
	---dollars per cwt---
Swine	
Market hogs	$47.50
Cull sows	42.50
Dairy	
Milk--Chicago	12.00
Milk--St. Louis	12.50
Cull cows	50.00

Other assumptions include interest rates held constant at 10.5 percent for real estate loans and at 11 percent for operating and machinery loans. Production costs are held constant for the four-year period as higher oil prices have already been factored into 1991 production costs. The authors increased production costs $4 per acre, $10 per sow, and $20 per dairy cow for 1991 over 1989 to reflect higher fuel costs. Farm program payments are assumed to decrease 14 percent from 1990 levels. Crop yields and milk production are projected to increase 1 percent per year. Other costs such as machinery purchases, livestock expenses, family living expenses, and miscellaneous expenses rise 2 percent per year. Land values and nonfarm income are assumed to increase 3 percent per year while used machinery depreciates 10 percent per year.

The smaller farming operations are assumed to have annual family living expenses of $25,000 and off-farm income of $6,375. The larger swine operations are assumed to have annual living expenses of $28,500 and no nonfarm income. Cash balances over $10,000 are invested at an 8 percent annual rate of return. In addition, $2,250 of income is placed into a retirement account if net earnings exceed family living expenses. The account has a starting balance of $9,000.

Two initial debt-to-asset (D/A) ratio assumptions are presented for each farm--one at 20 percent to reflect a moderate level of debt and one at 50 percent to reflect a relatively high leverage position. Net farm income and many other financial ratios are presented for these case farms over the next four years. Farmers and their advisers can utilize this information in evaluating the future financial performance of their farm businesses.

Northern and Central Illinois Swine Farms

Two sizes of northern and central Illinois swine farrow-to-finish operations are illustrated for this report. The smaller farm has 344 acres and 90 sows. This hog operation raises 1,270 market hogs annually from 171 litters with a weaning average of 8 pigs per litter. The larger operation has 951 acres and 200 sows. This hog operation raises 3,020 market hogs annually from 396 litters with a weaning average of 8.2 pigs per litter. Each hog farm feeds a ration of corn produced on the farm and soybean meal supplement. The feed efficiency ratio is 4 pounds of feed to 1 pound of gain. Other costs reflect the FBFM averages for the size of the operation.

The yields for corn and soybeans are assumed to be 130 and 40 bushels per acre, respectively. The county Agricultural Stabilization and Conservation Service (ASCS) yield is 120 bushels for corn. Set-aside for corn is 7.5 percent in 1991 and 10 percent in the following years. However, program payments are based upon only 77.5 percent of the corn base. The crop mix is approximately 50 percent corn base and 50 percent soybeans. Corn is planted on 92.5 percent of the corn base in 1991 and 90 percent is planted in subsequent years. Each of the two farms owns 200 tillable acres valued at $1,600 per acre. The balance of the acreage is rented on a 50-50 crop share lease with the landlord paying half of the fertilizer, chemical, and seed expenses.

Table 2 illustrates the acreage, number of sows, number of market hogs sold annually, capital expenditures, family living expenses, nonfarm income, hired labor expense, and an operator labor charge for each of the two northern and central Illinois swine farms. Capital purchases for machinery reflect the 1989 average of FBFM participants for an operation of this size. The operator labor charge is calculated by taking $1,250 times the number of operator labor months of each farm. The differences in capital expenditures, nonfarm income, and the labor expense reflect the size of the operation.

Results of Northern and Central Illinois Swine Farms

Table 3 illustrates the results of the four-year projection for the northern and central Illinois swine farms. Net farm income, net after-tax income, percent return on equity (ROE), cash balance, market value net worth, cost basis net worth, and the D/A ratio are given for each of the case farms. Each farm starts with an initial cash balance of $10,000 and a D/A ratio of either 20 percent or 50

Table 2. Economic Factors Associated with the Size of Northern and Central Illinois Swine Farms

	344 acres	951 acres
Tillable acres	344	951
Number of sows	90	200
	---------*annual*--------	
Market hogs sold	1,270	3,020
Capital purchases	$13,500	$45,000
Family living expense	25,000	28,500
Off-farm income	6,375	0
Hired labor expense	5,000	25,000
Operator labor charge	25,000	35,000

percent. Net after-tax income consists of the earnings from the farm business plus nonfarm income less federal, state, and social security taxes. The ROE percentage is calculated by taking net farm income less an unpaid operator labor charge and dividing that figure by the average of the beginning and ending market value net worths. The ROE percentage can be used to compare returns on farm investments with returns on nonfarm investments.

Net farm income ranges from $42,000 to $45,000 for the 344-acre and 90-sow farming operation with a 20 percent D/A ratio during the four-year period. Net after-tax income, which includes $6,375 of nonfarm income, ranges from $36,000 to $39,000. The ROE percentage is in the 4 percent range for the four-year period. The cash balance increases to $30,000 at the end of the fourth year. A positive cash balance means a farm can meet its loan obligations and family living expenses in a timely manner. Market value net worth increases $100,000 due to the 3 percent annual increase in land values and retention of some earning from farm and nonfarm sources. Cost basis net worth also shows modest gains from $318,000 to $371,000. The D/A ratio declines from 20 percent to 12 percent by 1994.

Net farm income and net after-tax income are projected to be between $24,000 and $26,000 for the 344-acre and 90-sow farming operation with an initial D/A ratio of 50 percent. The ROE percentage is barely positive for the four-year period after a $25,000 operator labor charge is considered. The cash balance falls to $5,000 with annual capital purchases of $13,500. Market value net worth increases with land appreciation and the market value D/A ratio declines to 44 percent. Net after-tax earnings over family living expenses are not sufficient to increase the cost basis net worth. The only financial progress on this farm is a result of inflating asset values.

Net farm income ranges from $69,000 to $71,000 for the 951-acre and 200-sow farming operation with a 20 percent D/A ratio. Net after-tax income averages just over $50,000. The ROE percentage averages over 5 percent for the four-year period when a $35,000 operator labor charge is subtracted. The cash balance rises to $47,000, even with $45,000 of annual capital purchases. Market value net worth increases to $842,000 from $670,000, and the cost basis net worth rises to $571,000 from $482,000.

Net farm income and net after-tax income averages $42,500 and $33,000, respectively, for the 951-acre farming operation with an initial D/A ratio of 50 percent. The ROE percentage averages 2 percent for the four-year period. Market value and cost basis net worths rise over the four-year period but not as much as for the same farm with a 20 percent D/A ratio.

The northern and central Illinois hog farms with an initial D/A ratio of 20 percent will make financial progress with $47.50 per cwt market hog prices while the hog farms with a 50 percent D/A ratio will only maintain their financial position. The larger hog farm with a 50 percent D/A ratio is able to handle this level of debt better than the smaller hog farm with the same level of debt due to the larger number of hogs raised annually and the number of acres operated. However, if hog prices decline from the current level, the larger swine operations will see greater reductions in income than the smaller swine farms.

Table 3. Projected Financial Position of Northern and Central Illinois Swine Farms

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
344 acres and 90 sows							
20 percent D/A ratio							
Initial				10,0 00	459	318	0.20
1991	42,730	36,818	4.30	16,166	481	329	0.18
1992	44,137	38,002	4.47	21,675	506	343	0.16
1993	44,638	38,665	4.40	25,909	532	357	0.14
1994	45,854	39,643	4.46	29,764	559	371	0.12
344 acres and 90 sows							
50 percent D/A ratio							
Initial				10,000	288	147	0.50
1991	24,365	24,515	0.03	7,878	297	146	0.49
1992	25,529	25,396	0.31	7,524	309	147	0.47
1993	25,512	25,492	0.12	6,111	322	147	0.46
1994	26,133	26,015	0.18	4,782	335	148	0.44
951 acres and 200 sows							
20 percent D/A ratio							
Initial				10,000	670	482	0.20
1991	69,915	49,435	5.49	22,356	709	503	0.18
1992	70,635	50,613	5.37	31,899	753	525	0.16
1993	69,762	50,538	4.99	39,624	797	548	0.13
1994	71,101	51,888	4.92	47,351	842	571	0.11
951 acres and 200 sows							
50 percent D/A ratio							
Initial				10,000	418	231	0.50
1991	42,615	33,010	2.14	7,227	444	238	0.48
1992	43,238	33,426	2.05	7,220	474	247	0.45
1993	41,905	32,536	1.52	7,358	504	254	0.43
1994	42,489	32,926	1.46	8,613	534	262	0.41

Table 4. Projected Financial Position of Southern Illinois Swine Farms

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
344 acres and 90 sows							
20 percent D/A ratio							
Initial				10,000	363	242	0.20
1991	43,383	37,169	5.78	17,279	379	254	0.19
1992	45,891	39,005	6.34	24,559	399	268	0.17
1993	45,822	39,460	6.11	29,728	421	283	0.15
1994	46,466	40,183	6.04	34,879	443	298	0.13
344 acres and 90 sows							
50 percent D/A ratio							
Initial				10,000	227	106	0.50
1991	28,631	27,361	2.28	7,188	233	108	0.49
1992	31,357	29,284	3.34	6,970	244	112	0.47
1993	31,244	29,315	2.92	6,615	254	117	0.45
1994	31,618	29,673	2.75	7,489	265	121	0.44
1,021 acres and 200 sows							
20 percent D/A ratio							
Initial				10,000	588	406	0.20
1991	72,998	51,562	6.87	25,489	620	428	0.18
1992	76,414	54,774	7.19	42,296	660	454	0.16
1993	75,222	54,879	6.72	56,578	701	481	0.14
1994	75,044	55,544	6.41	71,577	745	508	0.11
1,021 acres and 200 sows							
50 percent D/A ratio							
Initial				10,000	366	184	0.50
1991	48,848	36,849	4.36	9,470	384	191	0.48
1992	52,251	38,676	4.98	10,455	407	202	0.46
1993	51,043	38,053	4.26	9,522	432	211	0.43
1994	50,634	37,808	3.80	10,298	457	220	0.41

Southern Illinois Swine Farms

Two sizes of southern Illinois swine farms are used in this report. Again, the smaller swine operation has 344 acres and 90 sows, while the larger operation has 1,021 acres and 200 sows. The swine production assumptions, the prices, and the economic factors are the same as for the northern and central Illinois hog farms except for the acreage and the capital purchases. Capital purchases are $13,750 for the smaller hog farm and $40,000 for the larger hog farms. Other costs reflect the 1989 averages of southern Illinois hog farms participating in the FBFM record-keeping system.

The corn, soybean, and wheat yields are assumed to be 110, 34, and 50 bushels per acre, respectively. The county ASCS yields are 100 bushels for corn and 45 bushels for wheat. The target price for wheat is $4.00 with a 15 percent set-aside requirement. However, the program payments will be calculated on 77.5 percent of the wheat base acres after 1991. The crop mix is approximately 40 percent corn base, 40 percent soybeans, and 20 percent wheat base. Again, corn is planted on 92.5 percent of the corn base in 1991 and on 90 percent in subsequent years. Wheat is planted on 85 percent of the wheat base in each year. Each of the four farms owns 200 tillable acres valued at $1,000 per acre. The balance of the acreage is rented for $75 per acre cash rent.

Results of Southern Illinois Swine Farms

Table 4 illustrates the results of the financial projections for the southern Illinois hog farms. Net farm income ranges from $43,000 to $46,000 and net after-tax income averages over $39,000 for the 344-acre hog farm with a 20 percent D/A ratio. The ROE percentage averages just over a 6 percent return on net worth with a $25,000 operator labor charge. The cash balance rises to $35,000. Market value net worth rises $80,000 to $443,000 and the cost basis net worth increases $56,000 to $298,000.

Farm earnings reach the $30,000 level for the 344-acre hog farm with a 50 percent D/A ratio. Net after-tax earnings are slightly below $30,000 when $6,375 of nonfarm income is added to farm income. ROE reaches 3 percent, and the cash balance remains below its initial level of $10,000. Market value net worth increases nearly $40,000 while the cost basis net worth increases only $15,000.

Net farm income averages $75,000 and net after-tax income averages $54,000 for the 1,021-acre swine-grain farm with a 20 percent D/A ratio. The ROE percentage ranges from 6 to 7 percent when a $35,000 operator labor charge is subtracted from net income. The cash balance climbs to $71,000 from the earning of the farm business. Market value net worth rises to $745,000 from $588,000 while the cost basis net worth rises to $508,000 from $406,000.

Farm earnings reach $52,000 in 1992 for the 1,021 acre swine-grain farm with a 50 percent D/A ratio. The ROE percentage averages 4.40 percent for the four-year period. The cash balance remains near its initial level of $10,000 after $40,000 of annual capital purchases. For the four-year period, market value and cost basis net worths increase as the level of debt and the D/A ratio decline.

Southern Illinois hog farms with a D/A ratio of 20 percent will make great financial progress over the next four years if market hog prices stay above the $47.50-per-cwt level. Farms with a 50 percent D/A ratio will also make some financial progress over the next four years at that price level. The difference in financial outcomes between the southern and the northern and central Illinois hog farms occurs because of the value of land. Because of their higher land values, the northern and central Illinois hog farms have a higher initial debt and subsequent higher interest payments than the southern Illinois hog farms.

Illinois Dairy Farms

The dairy farm used in this projection model for both northern and central Illinois and southern Illinois consists of a 60-cow milking herd and 344 acres. The yearly average milk production is assumed to be equal to the 1989 FBFM average of 16,682 pounds of milk per year. Milk production is assumed to increase 1 percent per year over the next four years. Approximately 22 heifer calves are kept for replacement each year, while the remainder are sold at 200 pounds for $170.00 each. Cull cows are sold for $50.00 per cwt. The producing cows are fed a ration of corn, dairy supplement, and haylage. Average milk prices are assumed to be $12.00 per cwt for northern and central Illinois producers and $12.50 per cwt for southern Illinois producers. The difference in milk prices reflects the historical margins between the Chicago and St. Louis area milk quotations. Except for the higher fuel costs, other costs reflect averages for northern and central Illinois and southern Illinois FBFM dairy producers in 1989.

The crop yields and costs for the northern and central Illinois and southern Illinois dairy farms are the same as for the northern and central Illinois and southern Illinois hog farms, respectively. The dairy farms operate 344 tillable acres, 200 acres owned and 144 acres rented. The northern and central Illinois dairy farms rent land on a 50-50 crop share basis, and the southern Illinois dairy farms rent land for $75 per acre cash rent. The northern and central Illinois dairy farms have 122 acres of corn base, 122 acres of soybeans, and 100 acres of alfalfa. The crop mix on southern Illinois dairy farms is 100 acres of corn base, 100 acres of soybeans, 44 acres of wheat, and 100 acres of alfalfa.

Table 5 illustrates the acreage, number of milking cows, capital expenditures, family living expenses, nonfarm income, labor expense, and an operator labor charge for the northern and central Illinois and the southern Illinois dairy farms.

Results of Illinois Dairy Farms

Table 6 illustrates the financial projections of Illinois dairy farms. Net farm income averages $47,000 for northern and central Illinois dairy farms with a 20 percent D/A ratio. Net after-tax income is $41,000 when $6,375 of nonfarm income is included. The ROE percentage reaches 5 percent when a $25,000 operator labor charge is considered. The cash balance rises to $31,000 and the D/A ratio declines. Market value net worth increases $100,000 and the cost basis net worth increases $65,000.

Table 5. Economic Factors Associated with the Location of Illinois Dairy Farms

	Northern and central Illinois	Southern Illinois
Tillable acres	344	344
Number of milking cows	60	60
	---------annual--------	
Capital purchases	$19,000	$21,000
Family living expense	25,000	25,000
Off-farm income	6,375	6,375
Hired labor expense	7,000	9,500
Operator labor charge	25,000	25,000

Net farm income and net after-tax income average $28,000 for the northern and central Illinois dairy farms with a 50 percent D/A ratio. The ROE percentage averages a 1 percent return on net worth. The market value net worth increases with land appreciation, and the cost basis net worth increases slightly.

Farm earnings reach $50,000 for southern Illinois dairy farms with a 20 percent D/A ratio. The ROE percentage averages over 6 percent for the four-year period. Market value net worth increases substantially from land appreciation and earnings from the farm and nonfarm sources.

Farm income is in the mid- to low $30,000 range for southern Illinois dairy farms with a 50 percent D/A ratio. Net after-tax income of $33,000 includes nonfarm income of $6,375. The cash balance remains near its initial $10,000 level after $21,000 of capital purchases. Both market and cost basis net worth show modest increases for the initial debt level.

Table 6. Projected Financial Position of Illinois Dairy Farms with 344 Acres and 60 Cows

Scenario/ year	Net farm income	Net after-tax income	Percent return on equity	Cash balance	Net worth in (000)s Market	Cost	D/A ratio
Northern and central Illinois 20 percent D/A ratio							
Initial				10,000	450	305	0.20
1991	46,887	40,409	5.37	16,305	472	321	0.19
1992	45,733	40,226	4.92	20,656	497	336	0.17
1993	46,188	40,800	4.81	25,886	522	352	0.14
1994	48,111	42,212	5.01	31,684	550	369	0.12
Northern and central Illinois 50 percent D/A ratio							
Initial				10,000	285	139	0.50
1991	29,037	28,990	1.90	7,881	295	143	0.48
1992	27,550	28,103	1.08	6,921	307	147	0.47
1993	27,511	28,184	0.86	7,373	320	150	0.45
1994	28,811	29,159	1.12	8,610	334	153	0.44
Southern Illinois 20 percent D/A ratio							
Initial				10,000	395	253	0.20
1991	51,437	42,853	7.45	18,835	416	271	0.19
1992	49,854	42,578	6.79	23,949	438	289	0.17
1993	50,138	43,102	6.56	30,187	462	307	0.15
1994	52,072	44,577	6.75	37,177	488	327	0.13
Southern Illinois 50 percent D/A ratio							
Initial				10,000	247	105	0.50
1991	35,687	33,831	5.37	9,603	259	115	0.49
1992	33,683	32,598	4.12	9,039	272	123	0.47
1993	33,496	32,581	3.76	9,132	285	130	0.45
1994	34,935	33,649	4.09	9,319	300	139	0.44

Given a $12.00 per cwt milk price, northern and central Illinois dairy farms with a 20 percent D/A ratio will make sound financial progress, while the northern and central Illinois dairy farms with a 50 percent D/A ratio will make only slight financial progress over the next four years. At $12.50 per cwt, the southern Illinois dairy farms will make good financial progress, given their initial debt level assumptions.

Conclusion

The economic scenarios presented here were developed using the Farm Business and Financial Management Transition Planning Model. The results are based upon the authors' price, yield, and farm program assumptions and the FBFM cost and size averages for 1989. The model can easily be applied to specific farms or to assumptions that differ from those used in this newsletter.

For more information on the topics discussed in this newsletter, contact Kevin Koenigstein at (217)333-0479. The Transition Program is available through the IlliNet office at (217)244-5956.

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FIRST CLASS

FARM ECONOMICS
Facts & Opinions

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Conservation Compliance and Conservation Tillage Systems

Introduction

Conservation compliance is found in both the Food Security Act of 1985 and the Food, Agriculture, Conservation, and Trade Act of 1990. This provision encourages producers to develop and apply conservation plans on highly erodible lands. According to a timetable in the farm bills, plans should have been developed before the end of 1989. Before the end of 1994, producers should apply their conservation plans to the highly erodible land. Producers who fail to develop and apply a conservation plan to these lands will likely become ineligible to receive most U.S. Department of Agriculture benefits.

Most of the conservation plans that were written for conservation compliance include conservation tillage. These tillage methods support a fundamental rule of soil conservation: *Keep the soil surface covered.*

Recently, the Soil Conservation Service (SCS) adopted a conservation tillage guideline to help you identify acceptable production practices by crop. If you and SCS agree to the production practices and then you apply those practices, you will have achieved the conservation tillage part of your conservation plan and be one step closer to conservation compliance.

In the remainder of this newsletter, we discuss the new conservation tillage guideline, the "percent surface cover" method. A worksheet has also been provided for you to work through the procedure and identify the production practices that comprise each crop's conservation tillage system.

The Percent Surface Cover Method

Your goal is to apply profitable, more environmentally sound conservation tillage crop production systems on highly erodible land. For a specific crop, that means moving from your current erosive production system to a new production system typically characterized by more crop residue on the soil surface and fewer production activities (Figure 1).

The percent surface cover method adopted by SCS helps you achieve your income and soil conservation goals. The method relies on percent of the soil surface covered with residue during the critical erosion period. Your task is to identify the types and number of production activities that maintain percent surface cover at or above the amount stated in your conservation plan. You may use the conservation tillage design worksheet (see Figure 2) to work through the percent surface cover method and to record your decisions.

The percent surface cover method entails two sets of calculations: (1) estimates of percent surface cover after harvest; and (2) estimates of adjusted percent surface cover to account for production activities that

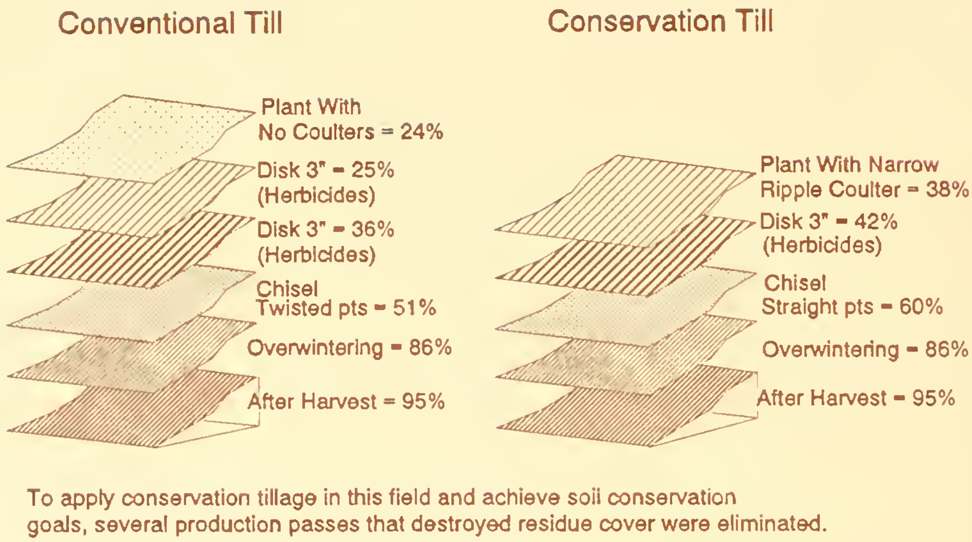

Figure 1. Conventional versus conservation tillage systems: soybeans after corn.

destroy crop residue. The following three tasks help you apply the percent surface cover method to your current system and your new conservation tillage system.

Task 1. Estimate Percent Surface Cover after Harvest.
As stated above, you must first estimate the percentage of the soil surface covered with residue after harvest. For this task, use the percent surface cover estimates by crop that are shown in Table 1. Generally, heavy-residue, high-yield crops such as corn and wheat provide sufficient quantities of residue to cover between 80 and 95 percent of the soil surface. Other crops such as soybeans produce smaller quantities of residue that cover between 65 and 85 percent of the soil surface after harvest.

Complete the following steps to estimate percent of the soil surface covered with residue after harvest.

Step 1. Select a field and crop in the rotation that is targeted for a conservation tillage production system.

Step 2. Fill in the operator and field section part of the conservation tillage design worksheet that includes spaces to write your name, ASCS tract and field numbers, current crop, prior crop, and average yields for the current and prior crops (Figure 2).

Step 3. Fill in the residue information section, especially the minimum allowable percent surface cover for the crop. This percentage may be found in your conservation plan.

Step 4. Using Table 1, estimate percent of the soil surface covered with residue after harvest.

Step 5. Record percent surface cover after harvest in both "percent surface cover" columns of the worksheet (Figure 2).

Table 1. Crops and Percent Surface Cover after Harvest

Crop and per-acre yields	Percent surface cover	Percent surface cover: continuous no-till[a]
Corn		
less than 100 bushels	80%	87%
100 to 150 bushels	90%	97%
151 bushels or more	95%	100%
Soybeans		
less than 30 bushels	65%	68%
30 to 50 bushels	75%	78%
50 bushels or more	85%	88%
Winter Wheat		
less than 40 bushels	80%	87%
40 to 50 bushels	90%	97%
50 bushels or more	95%	100%

[a]Residue from prior crop years tends to build up under no-till systems. This buildup contributes about 7 percent added surface cover for crops such as corn or wheat and about 3 percent for fragile crop residue such as soybeans.

Adapted from the Illinois Soil Conservation Service, 1990.

Task 2. Identify Production Activities by Crop and Calculate Percent Surface Cover for Your Current System.

The next phase is to adjust percent surface cover after harvest for production activities that destroy residue and for seasonal decay. The procedure entails two steps.

Step 1. Identify the amount of residue remaining after a production activity or season. Amounts (fractions or decimals) that represent residue remaining after a specific activity or season may be found in Table 2.

Step 2. For each production activity or season that reduces the amount of residue on the soil surface, multiply percent surface cover by the decimal assigned to the activity:

percent surface cover x decimal for the activity = adjusted percent surface cover

The adjusted percent surface cover equals the cumulative destructive impact of prior activities and seasons.

Any pass over a field that consists of either two or more production activities or combination equipment requires special attention. Percent surface cover should be adjusted for each part or piece of equipment that destroys and buries residue. Where necessary, separate the pass over the field into its different activities such as planting, fertilizing, and pest control. Then, repeat the procedure outlined above for each part of the pass over the field to more accurately estimate percent surface cover.

As an example, consider a corn-soybean rotation in an area where water erosion is a problem. The production activities and calculations for the current system are shown on the completed conservation tillage design worksheet shown in Figure 3.

Complete the following steps to identify the activities and percent surface cover for your current crop production system. For completeness during this design phase, list all passes over the field even if they do not destroy or bury residue.

Figure 2. Conservation Tillage Design Worksheet.

Operator and Field Section

Operator:____________________ Crop rotation: ________ ________ ________ ________

Tract______ Field_______ Yield/acre: _____bu. _____bu. _____bu. _____bu.

Residue Information Section

Crop to be planted:________ Prior crop residue:________ Crop from prior year:________

Minimum percent surface cover required through the critical erosion period:_______%

	Current System			Conservation Tillage	
Activities	Activity residue fraction	Percent surface cover	Activities	Activity residue fraction	Percent surface cover
Residue after harvest		_____%	Residue after harvest		_____%
Fall:____________________	_____	_____%	Fall:____________________	_____	_____%
Fall:____________________	_____	_____%	Fall:____________________	_____	_____%
Seasonal decay	_____	_____%	Seasonal decay	_____	_____%
Spring:__________________	_____	_____%	Spring:__________________	_____	_____%
Spring:__________________	_____	_____%	Spring:__________________	_____	_____%
Spring:__________________	_____	_____%	Spring:__________________	_____	_____%
Planting:________________	_____	_____%	Planting:________________	_____	_____%
Other:___________________	_____	_____%	Other:___________________	_____	_____%

Crop to be planted:________ Prior crop residue:________ Crop from prior year:________

Minimum percent surface cover required through the critical erosion period:_______%

	Current System			Mulch-till System	
Activities	Activity residue fraction	Percent surface cover	Activities	Activity residue fraction	Percent surface cover
Residue after harvest		_____%	Residue after harvest		_____%
Fall:____________________	_____	_____%	Fall:____________________	_____	_____%
Fall:____________________	_____	_____%	Fall:____________________	_____	_____%
Seasonal decay	_____	_____%	Seasonal decay	_____	_____%
Spring:__________________	_____	_____%	Spring:__________________	_____	_____%
Spring:__________________	_____	_____%	Spring:__________________	_____	_____%
Spring:__________________	_____	_____%	Spring:__________________	_____	_____%
Planting:________________	_____	_____%	Planting:________________	_____	_____%
Other:___________________	_____	_____%	Other:___________________	_____	_____%

Table 2. Activity Residue Amounts for Adjusting Percent Surface Cover, Illinois

Tillage and other activities	Amount of residue remaining[a] Soybeans	Corn or wheat
Moldboard plow	.03	.05
Chisel plow		
Straight shovel points	.50	.70
Twisted shovel points	.30	.60
Knife fertilizer applicator	.50	.80
Anhydrous applicator with disk openers	.75	.90
Disk (tandem or offset)		
3" deep	.40	.70
6" deep	.30	.60
Field cultivator	.50	.80
V-ripper	.50	.70
Planters		
No/smooth coulter	.90	.95
Narrow-ripple coulter (less than 1.5" flutes)	.85	.90
Wide-fluted coulter 1.5" flutes or larger)	.80	.85
Sweeps or double disk furrowers (till-plant)	.40	.60
Drills		
Disk openers	.85	.90
Hoe openers	.50	.70
Winter weathering	.70	.90
Decomposition in other seasons	.50	.75

[a]Climate, type of equipment, speed and depth of tillage, and timing of tillage can result in significantly higher or lower percentages. Use locally approved estimates when available.

Adapted from Dickey, Jasa, and Shelton, 1986; Illinois Soil Conservation Service, 1990.

Step 1. For the first crop listed on the design worksheet, identify and describe the first pass over the field after harvest or season in the "activities/seasons" column.

Step 2. Identify the amount of residue (decimal or fraction) remaining after the production activity or after seasonal decay. If the pass over the field does not destroy or bury residue, move to step 4.

Figure 3. Sample of the Conservation Tillage Design Worksheet.

Operator and Field Section

Operator: John and Jane Doe Crop rotation: corn soybeans ______ ______

Tract 1 Field 1 Yield/acre: 160 bu. 40 bu. ____bu. ____bu.

Residue Information Section

Crop to be planted: corn Prior crop residue: soybeans Crop from prior year: —

Minimum percent surface cover required through the critical erosion period: 30 %

Activities	Current System: Activity residue fraction	Current System: Percent surface cover	Activities	Conservation Tillage: Activity residue fraction	Conservation Tillage: Percent surface cover
Residue after harvest		75 %	Residue after harvest		75 %
Fall:		%	Fall:		%
Fall:		%	Fall:		%
Seasonal decay	.70	53 %	Seasonal decay	.70	53 %
Spring: anhydrous-disk/pen	.75	39 %	Spring: anhydrous-disk	.75	39 %
Spring: disk 3"	.40	16 %	Spring:		%
Spring: disk 3"	.40	6 %	Spring:		%
Planting: narrow rip. coulter	.85	5 %	Planting: narrow rip coulter	.85	33 %
Other: cultivation	.80	4 %	Other:		%

Crop to be planted: soybeans Prior crop residue: corn Crop from prior year: ______

Minimum percent surface cover required through the critical erosion period: 30 %

Activities	Current System: Activity residue fraction	Current System: Percent surface cover	Activities	Mulch-till System: Activity residue fraction	Mulch-till System: Percent surface cover
Residue after harvest		95 %	Residue after harvest		95 %
Fall:		%	Fall:		%
Fall:		%	Fall:		%
Seasonal decay	.90	56 %	Seasonal decay	.90	56 %
Spring: chisel-twisted	.60	51 %	Spring: chisel-straight pts.	.70	60 %
Spring: herb incorporation	.70	36 %	Spring: herb. incorporation	.70	42 %
Spring: herb incorporation	.70	25 %	Spring:		%
Planting: no coulter	.95	24 %	Planting: narrow rip. coulter	.90	38 %
Other: cultivation	.80	19 %	Other:		%

Step 3. Multiply percent surface cover by the decimal or fraction assigned to each component involved in the pass over the field and record the revised estimate of percent cover in the "percent surface cover" column of the worksheet.

Step 4. Identify other passes over the field or seasons and repeat steps 2 and 3 for each one identified.

Task 3. Identify Production Activities and Calculate Percent Surface Cover for the Conservation Tillage System.

To satisfy your soil conservation goals, percent of the soil surface covered with residue after production activities and seasonal decay should equal or exceed percent surface cover reported in your conservation plan for each crop. When percent surface cover after production activities falls below the minimum guideline, one or more activities may need to be dropped or changed to activities that do not destroy as much residue.

In the second half of Figure 3, the conservation tillage systems for the corn and soybean crops consist of fewer and different production activities. Specifically, corn was no-tilled into soybean residue and soybeans were mulch-tilled into corn residue to satisfy percent surface cover guidelines in the field's conservation plan.

Given the information you have recorded on the conservation tillage design worksheet, complete the following steps to identify the production activities that comprise your conservation tillage system.

Step 1. Reexamine the activities listed under the current production system on the design worksheet.

Step 2. After carefully considering your options, complete the conservation tillage part of the worksheet, filling in the activity residue amounts and recalculating percent surface cover. Do not overlook the adjustment(s) for seasonal decay.

Step 3. As a check, verify that percent surface cover after the production activities equals or exceeds the minimum percent identified in the conservation plan and written on the worksheet.

Task 2 and Task 3 should be repeated for the remaining conservation tillage crops in the rotation. You may also repeat tasks 2 and 3 for crops in the rotation that use a different production system.

Conclusion

The percent surface cover method is a relatively straightforward way to outline the types and number of production activities that comprise a conservation tillage system. Furthermore, the conservation tillage design worksheet may be added to the field's conservation plan folder. By applying the production practices listed on the design worksheet, you will satisfy the conservation tillage part of your conservation plan and be one step closer to meeting the conservation compliance provision of the 1985 and 1990 farm bills.

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FARM ECONOMICS Facts & Opinions

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Payment of Agricultural Wages with Commodities

Wages paid to agricultural labor on or after January 1, 1990, are subject to income-tax withholding. Income-tax withholding is required if the wages are subject to FICA (social security) tax. The following rules apply in determining whether agricultural wages are subject to FICA tax and, as a result, income-tax withholding.

1. If an agricultural employer pays $2,500 or more in wages (whether in cash or commodities), FICA withholding is required for all employees, even those who are paid less than $150.

2. If the total wages paid are less than $2,500, employees receiving less than $150 are not subject to FICA taxes.

3. Since January 1, 1988, cash wages paid to a spouse are subject to FICA taxes. Prior to that date, the wages were not FICA wages.

4. Since January 1, 1988, cash wages paid to a taxpayer's child who is 18 years of age or older are covered FICA wages. Prior to that date, wages paid to a child 21 years of age or older were covered FICA wages.

5. Qualifying noncash wages (payments in kind) paid to agricultural labor are not FICA wages.

Rule 5 has been the subject of considerable interest because the payment of agricultural wages with commodities eliminates the income tax and FICA tax withholding requirements and, in addition, the FICA tax liability. The following series of questions and answers helps to explain the payment of wages in kind rather than in cash.

FICA Taxes on Farm Wages

Ernie McCoy employs his wife Esther to work in his farm business. Before 1988, Ernie paid her cash wages that were not subject to FICA taxes because of the exception for wages paid to a spouse.

Question 1: Since the Omnibus Budget Reconciliation Act of 1987 repealed the exception for wages paid to a spouse after 1987, Ernie now wants to know if he can avoid paying FICA taxes on the wages he pays to his wife by paying her with commodities rather than cash.

Answer 1: If Ernie pays Esther with commodities, the value of the commodities is not included in wages that are subject to FICA taxes. Consequently, neither the employer nor the employee is liable for FICA taxes.

Question 2: Can Ernie pay Esther with warehouse receipts instead of actual commodities?

Answer 2: Under Rev. Rul. 79-207, the taxpayer paid its employees with warehouse receipts and they immediately redeemed those receipts with cash. The IRS ruled that such a payment was a payment in cash in economic reality and was therefore subject to FICA taxes.

Question 3: Can Ernie transfer grain to Esther as wages?

Answer 3: If Esther has the right to market her share of the grain when and where she wants, her wages are not subject to FICA taxes. If she chooses to market her grain at the same time that Ernie markets his, that choice should not affect the result.

Question 4: Can Ernie pay Esther with livestock?

Answer 4: Yes, as long as Esther has independent dominion and control over the livestock and does her own marketing.

Question 5: Does Esther have to pay self-employment tax on the proceeds she receives when she sells the commodities?

Answer 5: No, wages paid to employees are generally not included in self-employment income. There are certain exceptions but noncash payments to agricultural employees are not among them.

Question 6: Cash wages are subject to a $2,500 threshold before all employees are covered by FICA. Are noncash wages included in the $2,500 threshold?

Answer 6: Yes, the $2,500 threshold includes all agricultural wages—cash and noncash.

Question 7: Can Ernie avoid the FICA tax on wages paid to children age 18 and over and on wages paid to nonfamily members?

Answer 7: Yes, the rule that excludes noncash payments to farm workers does not require the worker to be any certain age or to be related to the employer.

Question 8: Do the answers you just gave for Ernie's spouse and children apply to an unrelated farm worker?

Answer 8: Yes!

Question 9: Ernie made the following payments of soybeans to Esther for her work on the farm during 1990.

Date	Amount	Fair market value
1-1-90	100 bu.	$ 565
2-1-90	100 bu.	525
3-1-90	100 bu.	485
4-1-90	100 bu.	535
5-1-90	100 bu.	575
6-1-90	100 bu.	605
7-1-90	100 bu.	610
8-1-90	100 bu.	625
9-1-90	100 bu.	620
10-1-90	100 bu.	590
11-1-90	100 bu.	515
12-1-90	100 bu.	490
Total	1,200 bu.	$6,740

Esther accumulated the soybeans during the year and sold all 1,200 bushels for $5.00 per bushel on December 20, 1990. She paid 5 cents per bushel to have the beans trucked to the elevator, and 1 cent per bushel was deducted from her check for a state marketing program.

How should the wages and sale of the soybeans be reported on the couple's 1990 tax return?

Answer 9: Payment of wages with soybeans is treated as if it were a barter transaction. Ernie must report the fair market value of the soybeans on the date they were paid to Esther as if he sold the soybeans on that date. Consequently, Ernie must report $6,740 as grain income on Schedule F. He also claims a labor expense deduction of $6,740 on Schedule F.

Ernie should not include the $6,740 on Form 943 or in box 12 of the Form W-2. He should include the $6,740 in box 10 of Form W-2.

Esther must report the $6,740 of wages on line 7 of Form 1040. She must also report the sale of the soybeans on Schedule D. Her basis in the soybeans is the $6,740 that she has reported in income as wages plus the trucking charges of 5 cents per bushel and the marketing fund deduction of 1 cent per bushel. Therefore, her total basis is $6,740 + $60 + $12 = $6,812.

Because the amount she received on the sale is $6,000, she has an $812 loss on Schedule D.

Question 10: Assume the same facts as in Question 9, except that Esther sells the soybeans for $7.00 per bushel. How should the wages and sale of soybeans be reported on the 1990 tax return?

Answer 10: Esther must report $6,740 as wages on line 7 of Form 1040. She must also report the sale of the soybeans on Schedule D, subtracting her basis of $6,812; this gives her a gain of $1,588. Because the gain is reported on Schedule D, it is not subject to self-employment tax.

Question 11: In order for this arrangement to be accepted by the Internal Revenue Service, the employee must be able to show that he or she had dominion and control over the commodity. What does this mean?

Answer 11: It means that the employee actually owns the commodity for a period of time and is treated by the entity storing the commodity as the owner. The employee should have the right to market the commodity when and by whatever means he or she decides. For example, if the commodity is stored at a local elevator and the owner-employer directs the elevator to sell a portion of the commodity and pay the employee, the employee does not have adequate dominion and control. Generally, when the commodity is stored at the elevator, the proper amount of the commodity should be transferred on the books to the employee and the employee should be responsible for any storage or administrative costs from that time on. If the commodity is in on-farm storage, the employer should provide the employee with documentation that the grain is in the employee's name, the employee should pay a fair portion of the trucking expenses to the place of sale, and the sale should be in the employee's name. The same general recommendations apply to livestock except that the employee should pay the appropriate maintenance and feed cost from the time the wage is paid with livestock until the livestock is sold. Good record keeping and documentation is very helpful if this kind of wage payment is questioned by the Internal Revenue Service.

Question 12: Is there any disadvantage to the employee when he or she is paid with a commodity instead of cash?

Answer 12: Yes, the employee does not qualify for social security benefits. Some employers pay the employee enough in cash so that the employee and his or her family at least qualify for disability benefits under the social security system. This matter should be discussed with the employee and the employee should sign a statement acknowledging the potential loss of social security benefits as a result of accepting wage payments in kind instead of in cash. Also, the employee should be told that income tax will not be withheld on the in-kind payments and the employee will be required to file quarterly income-tax estimates on the wages paid in kind.

Question 13: Is it likely that this exception from FICA tax liability will continue to be a part of the law?

Answer 13: This particular section has been scrutinized several times in the last four years by individuals drafting tax law changes and it remains unchanged. However, the exception may be eliminated at some time in the future.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 91-6 *April 1991*

Cost of Growing Corn and Soybeans in 1990

In 1990, the total of all economic costs per acre for growing corn in Illinois averaged $352 in the northern section, $349 in the central section with the higher soil ratings, $317 in the central section with the lower soil ratings, and $280 in the southern section. The soybean costs per acre were $279, $280, $252, and $226, respectively (see Table 1). Costs were lower in the southern section, primarily because land costs are lower there. The total of all costs per bushel in the different sections of the state ranged from $2.33 to $2.61 for corn and from $5.60 to $6.46 for soybeans. Variations in this cost were related to weather factors, yields, and land quality.

These figures were obtained from farm business records kept by farmers enrolled in the Illinois Farm Business Farm Management Association. The samples included only farms with more than 260 acres of productive and nearly level soils in each area of the state; these are farms without livestock. Farms located in 22 counties north and northwest of the Illinois River are included in the sample for northern Illinois. Farms from 36 counties below a line from about Mattoon to Alton are in the sample for southern Illinois. The remaining 44 counties make up the sample for central Illinois. The sample farms averaged 718 tillable acres in northern Illinois, 742 acres in the central section with high soil ratings, 769 acres in the central section with lower soil ratings, and 894 acres in southern Illinois.

This economic analysis includes some factors in the cost of doing business that nonagricultural businesses may not include. These factors are not used as expense items on income tax returns. Examples include the charge for labor performed by the farm operator, a rental charge for the use of owned and rented land, and an interest charge on equity in machinery and inventories of grain and livestock. In the short run, farm operators may continue to produce without covering these total economic costs of production. However, if returns do not equal the total economic cost of production in the long run, it will be difficult to maintain resources in the farm firm.

Nonland Costs

Soil fertility costs for soybeans were allocated on the basis of phosphorus, potassium, and lime removal, with the residual cost allocated to corn. The seed, crop, chemical, and drying expenses also included some commercial drying and storage and the estimated value of home-raised seed. The costs of fuel, machine hire, and machinery repair were reduced for income received from custom work. Labor costs included the cash value of hired labor, plus a charge for available unpaid labor at a rate of $1,350 per month. Building and storage costs were for repairs and depreciation only. The nonland interest rate in 1990 was set at 10 percent; this figure was then multiplied by the sum of half the

Table 1. Cost per Acre of Growing Corn and Soybeans on Illinois Grain Farms Without Livestock in 1990

	Corn				Soybeans			
	North	Central[1]	Central[2]	South	North	Central[1]	Central[2]	South
Number of farms	351	649	329	247	351	649	329	247
Acres in crop	393	357	361	304	252	335	327	366
Nonland Costs								
Variable costs:								
Soil fertility	$ 53	$ 53	$ 50	$ 49	$ 17	$ 18	$ 17	$ 17
Pesticides	26	22	21	22	24	22	22	24
Seed	25	23	23	21	12	13	12	14
Drying and storage	10	10	7	7	4	4	4	3
Repairs, fuel, and hire	33	30	29	34	26	25	25	30
Total, variable costs	$147	$138	$130	$133	$ 83	$ 82	$ 80	$ 88
Percent change from 1989	9	5	3	1	5	5	5	5
Other nonland costs:								
Labor	$ 27	$ 30	$ 29	$ 30	$ 27	$ 27	$ 25	$ 29
Buildings and storage	107	8	6	7	4	4	3	
Machinery depreciation	20	19	17	21	17	15	14	17
Nonland interest	28	26	23	18	25	23	19	17
Overhead	14	12	13	10	14	12	13	10
Total, other costs	$ 99	$ 94	$ 90	$ 85	$ 90	$ 81	$ 75	$ 76
Total, nonland costs	$246	$232	220	$218	$173	$163	$155	$164
Percent change from 1989	6	4	4	1	4	3	5	4
Land costs								
Taxes	$ 19	$ 21	$ 17	$ 8	$ 19	$ 21	$ 17	$ 8
Annually adjusted net rent	87	96	80	54	87	96	80	54
Total land cost	$106	$117	$ 97	$ 62	$106	$117	$ 97	$ 62
Total, all costs	$352	$349	$317	$280	$279	$280	$252	$226
Percent change from 1989	5	3	3	1	3	3	3	3
1990 yields, bushels per acre	135	149	136	112	47	47	45	35
Nonland cost per bushel	$ 1.82	$ 1.56	$ 1.62	$ 1.95	$ 3.68	$ 3.47	$ 3.44	$ 4.69
Total, all costs per bushel	$ 2.61	$ 2.34	$ 2.33	$ 2.50	$ 5.94	$ 5.96	$ 5.60	$ 6.46
1987-1990 average yield	123	133	117	117	42	43	39	35
Nonland cost per bushel	$ 2.00	$ 1.74	$ 1.88	$ 1.86	$ 4.12	$ 3.79	$ 3.97	$ 4.69
Total, all costs per bushel	$ 2.86	$ 2.62	$ 2.71	$ 2.39	$ 6.64	$ 6.51	$ 6.46	$ 6.46

NOTE: The entries shown below the "dash" line are costs based on 1987-1990 average yields.

[1] Soil productivity ratings of 86 to 100.

[2] Soil productivity ratings of 56 to 85.

average inventory value of crops at the beginning and the end of the year, the depreciated value of machinery and buildings, and half the total operating expenses. The result is the total nonland interest charge. Overhead costs included insurance, utilities, the farm share of light vehicle expenses, and miscellaneous items. No charge has been made in this analysis for management, but it would normally be about 5 percent of the total cost per bushel, or 10 to 15 cents for corn and 25 to 30 cents per bushel for soybeans.

Land Costs

Land costs included the adjusted net rent and the real estate taxes. Net rent was represented as the average rent received by crop-share landlords on record-keeping farms for the period 1986 to 1989. Caution is needed in interpreting differences in land costs between areas. In the long run, the net rent residual return to landowners should tend to equalize the total cost of production.

Cost per Bushel

Production costs per bushel of corn increased in 1990 for most areas of the state compared to 1989 due to higher total costs per acre and, in certain areas, lower yields. The increase in costs per bushel ranged from $0.05 in central Illinois farms with the lower soil rating to $0.32 in southern Illinois. There was no change in the cost per bushel to raise corn on the central Illinois farms with the higher soil ratings. The average corn yield was 1 to 4 bushels per acre higher on central Illinois farms but 10 and 15 bushels per acre lower on the northern and southern Illinois farms, respectively. The 1990 average corn yield in northern and central Illinois was 12 to 19 bushels per acre above the four-year average from 1987 to 1990 while the average yield in southern Illinois was 5 bushels per acre below the four-year average. Total costs per acre increased in all four areas of the state, ranging from a 1 percent increase in southern Illinois to a 5 percent increase in northern Illinois. Most of the increase in costs occurred in the variable cost component, mainly pesticides, drying and storage charges, and machinery repairs and fuel.

Production costs per bushel of soybeans also increased in 1990 compared to 1989 as a result of increased total costs per acre. Yields were also lower in most areas of the state. The increase in costs per bushel ranged from $0.98 in southern Illinois to $0.20 on the northern Illinois farms. Average soybean yields decreased in a range of 1 to 2 bushels per acre on central Illinois farms to 5 bushels per acre on southern Illinois farms. Yields remained the same on the northern Illinois farms. Total costs per acre increased 3 percent in all areas of the state. Average soybean yields in northern and central Illinois were 4 to 6 bushels per acre higher than the four-year average from 1987 to 1990. Soybean yields in southern Illinois were the same as the four-year average.

For the first time in nine years, total costs per acre to produce corn increased as compared to the year before. These costs had been declining from 1981 through 1989, decreasing from $390 per acre to $322 per acre (see Figure 1). Most of this decrease occurred in machinery depreciation and interest charges. Cash costs such as fertilizer, chemicals, and seed declined very little during this period. Total cost per acre to produce soybeans also increased for the first time in nine years, increasing from $257 per acre in 1989 to $265 per acre in 1990 (see Figure 2). Total costs per acre had declined from $308 in 1981 to $257 in 1989. All of this decrease had come from the other nonland and land costs. Variable costs have actually increased slightly since 1981. The factors that reduced the total cost per acre to produce corn were also the factors reducing soybean costs. After an extended period of declining costs, 1990 may be the beginning of a turnaround in this trend. Producers will need to monitor their costs and financial position closely in the upcoming years to avoid getting caught in a cost-price squeeze similar to the one that occurred in the early 1980s.

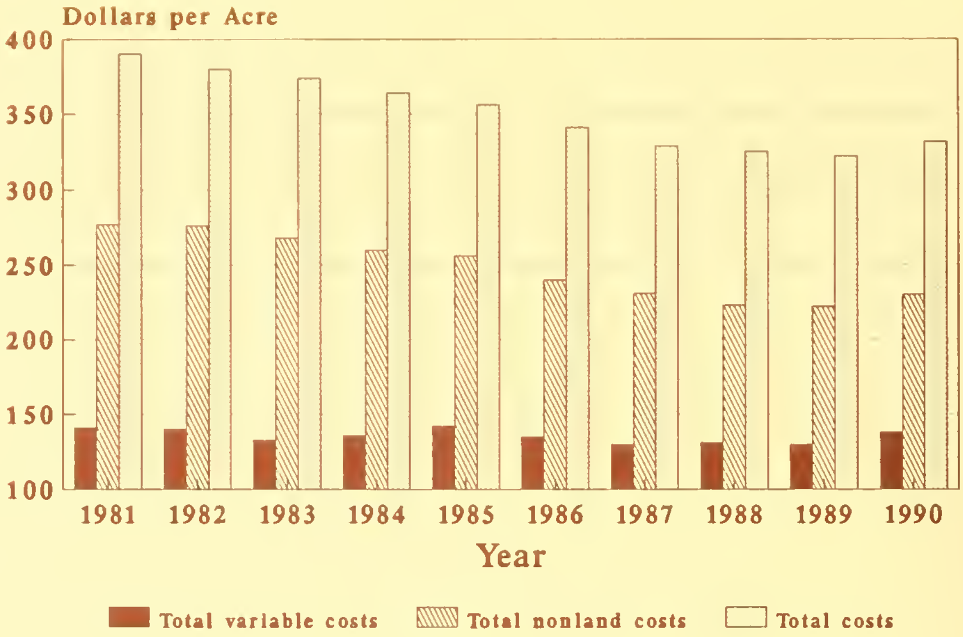

Figure 1. Total costs per acre to grow corn on Illinois grain farms.

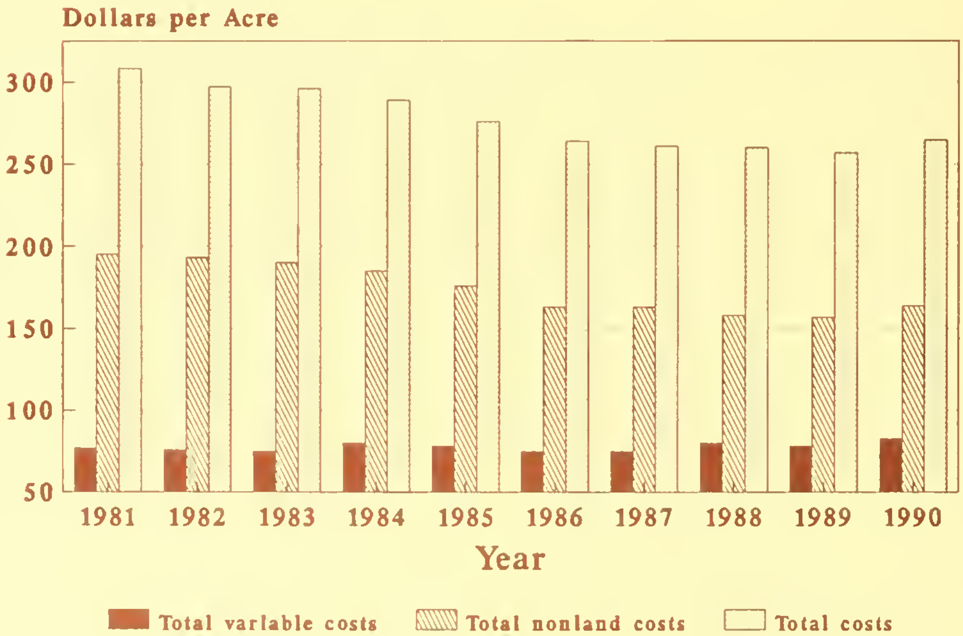

Figure 2. Total costs per acre to grow soybeans on Illinois grain farms.

Current selling prices for corn and soybeans are below the average total 1990 cost of production when using the average yield for the past four years. It should be noted that this four-year period includes the drought year of 1988 when yields were reduced significantly. An owner-operator with average yields during the past four years (1987 to 1990) would need $1.04 to $1.20 per bushel for corn and $1.91 to $2.51 per bushel for soybeans to recover the variable costs listed in Table 1. Recovering the total of all costs would require receiving $2.39 to $2.86 a bushel for corn and $6.46 to $6.64 a bushel for soybeans. Individual tenants and landowners computing the average break-even cost per bushel for growing corn and soybeans should divide the costs and yields shown in the table as they are shared by the terms of the lease.

Farmland values are related to grain prices and the nonland costs of production because income left after other costs have been deducted is considered the return to land. Values for Illinois farmland increased by about 20 percent during the past three years after having declined by almost 50 percent since 1979. This turnaround was due to improved farm earnings and a return to farmland that was more competitive with alternative nonfarm investments. Farm earnings for 1990 will be similar for most areas of the state when compared to 1989. The financial side of the agricultural sector has rebounded from the financial stress of the early and mid-1980s. In addition to improved farm earnings and increasing land values, farm operators have also increased their expenditures for machinery and equipment. However, farm operators will need to monitor their financial conditions closely and avoid excessive levels of borrowed capital to finance their businesses. Some situations that are occurring now could lead to future problems for the agricultural sector. These situations include an increase in production costs and an increase in planted acres of certain feed grains. The latter increase could lead to a buildup in grain stocks, resulting in lower grain prices. We can also expect a decrease in support from government farm programs. To remain competitive in the future, farm operators will need to continue to monitor and control costs, use borrowed capital wisely, and adopt new technologies that will increase the economic productivity of their farm businesses.

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FARM ECONOMICS Facts & Opinions

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Issue 91-7 *May 1991*

Major Challenges Facing RURAL PARTNERS®

This article describes a new program in community and economic development led by faculty in the Department of Agricultural Economics. The program is *Helping Rural Communities Prepare for Economic Development.* It is funded by the W.K. Kellogg Foundation, RURAL PARTNERS®, and the University of Illinois.

The Situation in Rural Illinois

Economic downturns in agriculture, mining, and traditional manufacturing have produced a rural crisis in many of Illinois's 1,006 small towns and villages with populations less than 5,000. Rural counties find it increasingly difficult to maintain viable business environments. Local governments are struggling to provide needed services in the face of dwindling sales and property tax revenues. While income diversification and local economic development have become rallying cries across the state, the rate of new job growth in rural Illinois is very near the bottom for the 50 states. Between 1981 and 1987, urban areas in Illinois added 423,000 new jobs while rural areas added only 20,314. With more than 20 percent of the state's population, a 5 percent share of new job growth is far too low. Furthermore, most of these new jobs pay minimum or low wages and are not substantially increasing wealth in rural communities.

The strength of the agricultural sector has always been important to the overall rural economy. However, it has been recognized recently that this coin has two sides; in many communities, more than half of the income to farm families comes from off-farm sources. Community leaders have recognized the increasing risk inherent in a local economy that depends on one or two sectors. Diversifying income sources is becoming a farm family and community goal. State agencies and organizations in the private and public sectors have a stake in providing services and leadership to rural communities for economic development, but "top-down" programs have not been very effective. Often, outside efforts in economic development aren't coordinated with local interests and needs.

Critical Local Needs Have Not Been Met

From 1980 to 1987, more than 110,000 people migrated from rural Illinois. During 1987, per capita income in rural counties was $13,147, while urban income averaged $17,113, nearly $4,000 more. Obviously, change is needed. While rural economic development is high on the agenda of local, state, and federal governments, *there is no legislation in Illinois or the nation designed exclusively and specifically to aid rural counties with consistently declining economies and populations.*

Many groups and institutions voice support for the problems of rural America, but the problem of rural community and economic development has not been adequately addressed by state and federal governments. Urban areas receive more than their fair share of the federal dollar, and most federal expenditures in rural areas are not for development. For example, 66 percent of federal expenditures in rural Illinois is for income redistribution.

Often, government agencies and private groups aren't aware of each other's efforts or of all the initiatives of local groups. With the critical needs in rural Illinois, this is no time for waste or duplication. The situation demands that rural counties build networks and coalitions to accomplish local objectives. Cooperation among economic development partners—organizations and institutions sharing multiple interests in rural communities—is more important than ever.

RURAL PARTNERS® Organized to Coordinate Rural Development

Faculty in the Department of Agricultural Economics at the University of Illinois initiated the creation of RURAL PARTNERS: The Illinois Coalition for Rural Community Development to attack the problems of rural Illinois communities with creative programs for community and economic development. Since June 1989, more than 120 organizations and state leaders have joined RURAL PARTNERS, and 14 members have joined the University of Illinois Cooperative Extension Service and the W.K. Kellogg Foundation to provide more than $1,800,000 to fund the new program, *Helping Rural Communities Prepare for Economic Development.*

Purposes of This New Program

The purposes of the program are (1) to create and implement comprehensive countywide development programs in rural counties that will enable those counties to develop actions and strategies for competing more effectively in economic development efforts and (2) to empower local leaders to bring new vision and energy to their rural communities so they will have higher levels of control over their economic destinies. RURAL PARTNERS believes development is everybody's business; and, because of the nature of our global economy, development is a process and a task which is never finished. This belief guided us as the following action strategies were planned.

Program Action Strategies

Empowerment is achieved by several action strategies. First, a "menu of 19 Community Action Modules" (CAMs) is being developed. Why is a "menu" of modules being used? All rural communities are not equally ready for community and economic development. To meet the wide range of needs, a menu of CAMs is required. Modules contain educational materials with information on leadership development, community development, and technical assistance issues essential for economic development.

Second, academics and practitioners are working together to develop the modules. The menu of CAMs is still being developed by author teams: more than 35 experts who are faculty members at the University of Illinois and other universities in Illinois and professionals (practitioners) in economic development. These teams are working to bridge the gap between theory and practice in every community action module.

The Menu of Community Action Modules follows:

- Identifying and Recruiting Leaders for County Development Groups
- Conducting Needs Assessment Studies in Your County
- Leadership Roles in Community Groups
- Strategic Planning for Community and Economic Development
- Working with Committees
- Conflict Management in Community Groups
- Retaining and Expanding Local Business and Industry
- Developing a Labor Force Profile for Your County
- Developing County Economic Profiles
- Maintaining Interest in and Support for Development Groups
- Analyzing the Retail Trade Market of Your Community

- Initiating New Businesses
- Developing Industrial Targeting Skills
- Analyzing Economic Impacts
- Marketing Your Community and County
- Presentation Skills
- Entrepreneurship
- Inventory of Products
- Analyzing Social Impacts of Development

Third, we are placing priority on application of knowledge and skill to local problems. The heart of each module is a series of case studies, work sheets, exercises, and action strategies on issues important to community and economic development programs. Completing the action exercises using data about the county will mean that local groups are already beginning the process of community development required before economic development can happen. When appropriate, some modules contain interactive computer-based simulations with data on economic facts and other information about the county.

Fourth, countywide groups control the implementation of local action programs. Twelve counties are participating in the first three years of the program. All 12 developed a countywide proposal and entered a competition before they were selected. Each county designated a team of six local residents to work as county development coordinators with up to 25 percent of release time and salary support by local sponsors from the private and public sectors. All CAMs are being implemented by these rural leaders—more than 76 persons who live and work in the target counties—not outsiders.

Fifth, the emphasis is on action learning. All modules contain action strategies which will empower leaders of the counties:

- to understand the demographic, social, and economic realities and/or comparative advantages of their county and its communities;
- to engage in broad-based county and community planning and decision making, reflecting the needs, goals, and values of individuals and groups in their communities;
- to develop a common vision of the future for community and countywide development and to create the desire and ability to act together to achieve that vision;
- to develop local economic development programs that will help make the county and its communities places where new jobs will be created;
- to demonstrate to all other rural counties in Illinois that when RURAL PARTNERS—local citizens, community groups, and state organizations from both the private and public sectors—work together in successful, comprehensive community development programs, economic development is more likely to occur.

Emphasis Has Been on Industrial Development, Not Community Development

Many development programs in rural Illinois have been based on the philosophy that economic development (grants, low-cost community development loans, or new industry) is brought to the community from outside sources. Programs in comprehensive community preparedness for economic development with a local focus have been ignored, especially in rural counties with declining populations. Many leaders seemed to believe that leadership and community development programs in rural counties did not have a tangible political payoff.

The approach in many rural communities has been to hire outside consultants or to bring in state agency staff with the technical skills to make something happen in the community. This strategy depends primarily on external resources to improve the community. It ignores self-help, the involvement of local citizens, and the development of local leaders. In summary, many programs have not included broad-based local participation from rural communities in planning or leading the development process.

The Countywide Development Focus Is a Challenge

Helping Rural Communities Prepare for Economic Development is a RURAL PARTNERS program with a focus that is not unique to leaders in the field of community development, but it is different from many earlier efforts in rural Illinois. The focus is absolutely and fundamentally sound to the development process in a democratic society because it emphasizes local citizen participation, leadership development, and empowerment of local citizens for decision making in community and economic development.

The Program Philosophy Provides a Challenge

Rural community development first addresses development *of* the community rather than *in* the community. Development *of* the community strengthens the capacity of existing and emerging leaders to carry out local economic development efforts. Involving citizens from throughout the county is not an easy task. Thus, rather than being solely activity-oriented, the program is process-oriented, too. The program's major goal includes the development of leadership and decision skills in large groups of citizens so more leaders will be available to help give needed guidance to their communities and help shape the economy of the future.

Community development means increasing citizen involvement and participation. It enhances rural community identity, pride, and solidarity, which is lacking in many communities with declining populations and economies. Community development facilitates leaders' abilities and desires to make objective, rational, and intelligent decisions and to act together on these decisions.

Development *of* the community provides local infrastructures—social, political, economic, and physical—that facilitate entrepreneurial development *in* the community. In summary, the RURAL PARTNERS program emphasizes leadership development, organization development, planning, and technical assistance to firms at the request of and in cooperation with local groups. The program philosophy is: *Development is everybody's business—it's a process and task that is never finished.*

Teamwork Is Not Easy, But It Is More Fun!

All program activities are implemented in agreement with principles which support a framework for teamwork. The following principles require our best efforts.

- A belief in and commitment to extensive local involvement in community and economic development is essential. Development is done *with* local citizens, not *to* them! As many local groups as possible should be involved.
- Rural community and countywide development must be a team effort. A framework for teamwork is followed which uses inclusiveness, not exclusiveness. Decision-making is shared among a statewide program advisory committee, the program staff, and cooperating county groups. However, we are not naive. We know disagreements will happen. Our module on conflict management will help groups manage disputes so they will not be controlled by them.
- The primary focus is on the entire rural county, not the county seat or separate villages or towns in a county. The county government is the primary and most important unit of government in a rural county. Resources are limited in most rural counties, and countywide cooperation is critical to success. This focus requires coordination and cooperation among local villages and towns that may be prone to competition in economic development and other efforts instead of working together.
- The sponsoring RURAL PARTNERS and the program staff attempt to model democratic teamwork. As we develop, implement, and evaluate all program activities in cooperation with county groups, participative management and democratic decision-making is used. Consensus is reached before actions are taken.

- There is no quick, easy fix. Needs assessment studies, strategic planning, leadership development, and extensive technical assistance programs in community and economic development are required to enable rural counties to prepare to compete more effectively in the economic development arena.

Sustaining the Effort Will Not Be Easy

There has been such a strong emphasis on economic development in some rural Illinois counties that many of these principles, which are fundamental to community development, are either ignored or inadequately emphasized. It will not be easy to implement a program that may not have a quick, tangible payoff. While tangible projects are critical and vital to rural counties, they are the product of community and countywide development. In and of themselves, brick and mortar, or other development projects of a tangible nature, do not necessarily indicate that local community development has occurred. Some economic development programs may have gotten away from one of the unique features of rural life—its unique community flavor!

The members of RURAL PARTNERS who are sponsoring *Helping Rural Communities Prepare for Economic Development* recognize that hard work and continuing efforts are required. Community and economic development are tasks which are never really completed. When one challenge has been solved, another is there to be tackled. Much work is required to empower local citizens to have more control over the economic situation in their counties. With the belief that development is everybody's business—a never-ending task that demands our best effort—RURAL PARTNERS will make a difference in rural Illinois.

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Issue 91-9 *June 1991*

Are Land Prices High Enough?

Land prices have been rising since 1986 when they reached their low point in the Midwest, at about the same time that the Treasury Bill rate reached its low point of 5.1 percent (October 1986). Since then, Illinois land prices have advanced from 20 to 30 percent, depending on the quality of the land and the area of the state. A few buyers realized that returns on some farmland in 1986 and succeeding years on a current account basis were higher than returns from alternative riskless investments such as U.S. Treasury Bills. The rate of inflation in the general economy had also declined to a low of 1 percent per year so that this gap in returns between farmland and T-Bills was positive and real for farmland. Farmland prices began to rise.

Table 1 gives average net returns per acre to the landowner with a typical crop-share lease on farmland with a soil productivity rating from 86 to 100, where 100 is the best. It also shows the average value of such land and a number of other important variables over the period from 1960 through 1989. We have data prior to 1960 but they are incomplete. The data end in 1989 because that is the most recent year for which complete data are available. From 1973 to 1989, land earnings reached a new higher level, ranging from $80 to $110 per acre for the whole period (except for the drought year of 1988).

Besides interest rate and rate of return comparisons, another measure of comparison can be made from the table: the price/earnings (P/E) ratio, often used in the stock market. The P/E ratio is the price of the asset divided by the earnings. In 1972, the P/E ratio dropped below 20 for the first time since the beginning of the data series (or since before 1960), indicating that the rate of return for farmland had gone above 5 percent. The P/E ratio continued relatively low through 1978, but then climbed rapidly; it reached a high of 39 in 1981, indicating a return of only 2.6 percent. Following that time, the P/E ratio began falling, reaching 20 in 1985 and a low of 18 in 1987 (the same as in 1972). The P/E ratio has increased since 1987 and now ranges from 20 to 22, which is historically low; it has been below 20 only five times in the last 30 years. When the P/E ratio is relatively low, as it has been recently, returns are more favorable for investing in a long-term asset such as land. A high P/E ratio usually characterizes an asset that has had considerable growth in value, where returns increases are lagging behind an increase in asset value and where buyers expect that growth in asset value will continue. Obviously, those expectations exhibited in the market from 1977 through 1981 did not materialize. I believe we have now entered an extended period in which the P/E ratio will follow a random path in the 18 to 24 range (called a "random walk" by statisticians).

A factor in evaluating land investment and returns that I have stressed over the years more than any other, especially for persons

Table 1. History of Returns per Acre to Landowner on Crop-Share Leased Farms with Soils Rated from 86 to 100

Year	Net returns per acre	Average land price per acre	Price-earnings ratio	Consumer price index	Current rate of return	Mortgage interest rate	Financing cost	T-Bill rate	T-Bill returns
1960	$ 21	$ 550	26	1.6	3.8%	6.0%	33		
1961	23	535	22	1.1	4.3	5.6	29		
1962	26	550	21	1.2	4.7	5.6	30		
1963	29	580	20	1.2	5.0	5.6	32		
1964	27	605	22	.6	4.8	5.6	33		
1965	30	650	21	2.5	4.6	5.6	36		
1966	33	730	22	2.9	4.5	5.8	42		
1967	29	775	26	2.9	3.8	6.0	46		
1968	24	805	33	4.2	3.0	6.8	54		
1969	30	830	27	5.4	3.6	7.8	64		
1970	33	820	24	5.9	4.0	8.7	71		
1971	34	825	24	4.3	4.1	7.9	65		
1972	48	895	18	3.3	5.4	7.4	66		
1973	85	995	12	6.4	8.6	7.5	74	7.8	78
1974	107	1,335	12	10.8	8.08	8.1	108	7.2	96
1975	80	1,610	20	9.1	5.0	8.7	140	6.0	99
1976	103	2,005	19	5.8	5.1	8.7	174	5.2	104
1977	89	2,720	31	6.7	3.3	8.5	231	4.9	133
1978	95	3,010	21	9.9	3.2	8.5	355	7.0	190
1979	110	3,400	31	8.0	3.2	9.2	312	9.1	309
1980	108	3,500	32	14.8	3.1	11.0	385	8.0	280
1981	93	3,605	39	10.6	2.6	12.8	461	14.2	512
1982	90	3,280	36	3.6	2.8	13.5	443	12.6	413
1983	102	3,215	32	3.8	3.2	12.5	402	8.8	282
1984	91	2,630	29	3.9	3.5	12.0	315	9.9	260
1985	110	2,200	20	3.7	5.0	2.5	275	7.0	154
1986	84	1,885	22	1.0	4.4	11.5	217	6.0	113
1987	95	1,731	18	3.8	5.5	10.5[a]	182	5.6	97
1988[b]	63	1,860	30	4.6	3.4	11.0	205	6.5	121
1989	97	2,040	21	4.8	4.8	11.0	224	7.7	161

[a]Federal Land Bank rate for new borrowers with good credit risk. Land values are based on comparable sales in selected years with interim adjustment based on the USDA index.
[b]Widespread drought.
SOURCE: J.T. Scott, Jr. Updated December 1989. "Factors Affecting Land Price Decline: Where to From Here?," Publication #AE-4657, Department of Agricultural Economics, College of Agriculture, University of Illinois at Urbana-Champaign.

who have to borrow money when buying a big-ticket investment--is the financing cost. The financing cost used in Table 1 is the annual payment necessary on a 30-year mortgage (interest and principal) at the interest rate at time of purchase as if the entire purchase price was borrowed. Compare this "cost" with the rental return. Obviously, if land is purchased entirely with cash, a financing cost may be irrelevant to an individual investor. For that kind of investor, rates of return on alternative investments are more relevant. Farmers have generally been willing to buy land when they could pay from 30 to 50 percent down and let the equivalent rental return pay the mortgage. This was possible from 1960 to 1972, when the full financing cost ran from a low 115 percent to around 200 percent of the net rent. In 1973 and 1974, financing cost was equal to or less than net rent. The financing cost went up rapidly relative to net rent beginning in 1977, reaching a high in 1981 when financing cost was 496 percent of net rent. The financing cost even exceeded the *gross* farm return for that year, which was $315 per acre, according to our records. An investor would have needed 80 percent cash down for the net rent to carry the mortgage. [I wrote in *College Research* magazine in 1978 that farm returns alone could no longer support land prices at then-current levels, which were about $3,000 per acre.] What does this ratio of full financing cost to net rent look like now? It reached a low of 195 percent in 1987 and is still at a traditionally reasonable level, just over 200 percent. This means that 50 percent cash down is needed for net rent to pay the mortgage.

The cash investor need not be concerned about losing the land because of inability to pay the mortgage. The more relevant criterion is a "cost of ownership" or opportunity cost comparison. In this case, the cost of ownership selected is the alternative amount foregone in another investment because of the decision to invest in land. The T-Bill rate and return from an investment in T-Bills equal to the per-acre investment in land is used as an alternative riskless investment. These data are also included in Table 1 for the modern return period beginning in 1973. The one-year T-Bill rates are those that existed at the midpoint of each year, ranging from 5.6 percent in 1987 to 14.2 percent in 1981. During this 17-year period, there were only two years when returns on T-Bills were less than on land if the amount invested in T-Bills was the same each year as the price of land. The total net rent over these 17 years was $1,602, or $94 per acre per year. The total return from T-Bills was $3,400 or $200 per year.

Alternatively, assume that $995 had been invested in T-Bills in 1973 with no change in the T-Bill investment in the following years, the same as the amount of money invested in land in 1973 (Table 2). The total return for 17 years on the T-Bills would have been $1,328, or $78 per year ($16 per year less than on land); the present investment value on T-Bills would be $995 and $2,040 on land, a gain of $1,045 with land. The total advantage of land investment in returns and gain over T-Bills, with land investment in 1973 and disinvestment in 1989, would have been $1,319 per acre. If the same thing had been done beginning six years later in

Table 2. Returns from Land and T-Bills Purchased in 1973 and 1978 and Sold in 1989

Returns	Purchased in 1973 Land	Purchased in 1973 T-Bills	Purchased in 1978 Land	Purchased in 1978 T-Bills
Investment	995	995	3,010	3,010
1989 sale value	2,040	995	2,040	3,010
Gain or loss from sale	1,045	0	-970	0
Total of annual returns	1,602	1,328	1,138	3,081
Total return	2,647	1,328	168	3,081
Difference in returns	1,328			2,913
Percent return on investment	8.54	7.75	.001	8.79

1978 at $3,010 per acre, the total return for T-Bills over the 12-year period would have been $3,081 or $257 per year, compared to $1,138 or $95 per acre per year on land. The 1989 investment value on T-Bills would be $3,010 and on land, $2,040. With land investment made in 1978 and disinvested in 1989, the advantage would have been to T-Bills in the amount of $2,914 per acre.

Clearly, timing is everything in any investment with a significant degree of volatility in the investment value. So is now the right time to buy land? Based on the historical values of net rents, the P/E ratio, and the "ownership-cost-to-net-rent" ratio, land prices at present may not be too high to buy now. However, based on the income and interest rate outlook for the next few years, land prices are certainly high enough. The risk of buying now is increasing. You need 50 to 60 percent cash down for the net rent to pay the mortgage.

Reports indicate that there is no longer a food shortage in Poland. As other Eastern European countries, including Russia, move toward capitalism (barring civil uprisings), they will move to attain food self-sufficiency and surpluses, particularly in grains. This situation will have a negative long-range effect on our grain exports. We will need to hope for rising consumer income (effective demand) in other parts of the world where food is in short supply. Government subsidies due in part to our fiscal problems are declining. Thus, the overall outlook for farm income over the remainder of this century is declining on a per-acre basis, even though it may be stable or rising on a per-farming-unit basis.

Interest rates are low relative to the time period since 1978, but high relative to rates prior to this time period. While the Federal Reserve Bank may be able to maintain these relatively low rates for some interim period to help stimulate the economy, interest rates will probably rise because of the increased world demand for investment. The Mideast War has resulted in substantial investment demand in Kuwait and Iraq, and the demand for both private and public investment in Eastern Europe following Communist rule will be staggering because of their previous lack of investment in infrastructure and consumer manufacturing. This pressure on the demand side and low savings ratio on the supply side will push up the price of money, and interest rates will rise.

In the long run, downward pressure on income to land and upward pressure on interest rates will cause downward pressure on land values. Land prices are currently high enough, perhaps too high for prudent investment; and, as the future unfolds, land prices will decline in "real" dollars (deflated for inflation), even though there may be some further increase in current (nominal) dollars.

For your reference, we have included Table 3, *Index Numbers of Illinois Farmland Values.*

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Table 3. Index Numbers of Illinois Farmland Values

Date	Index numbers (1967=100)[a]	Date	Index numbers (1967=100)	Date	Index numbers (1967=100)
1912	25	1942	23	1972	116
1913	26	1943	24	1973	129
1914	27	1944	27	1974	173
1915	27	1945	29	1975	209
1916	27	1946	32	1976	260
1917	29	1947	37	1977	100[b]
1918	31	1948	39	1978	111
1919	34	1949	41	1979	125
1920	42	1950	42	1980	135
1921	40	1951	50	1981	143
1922	33	1952	54	1982	131
1923	32	1953	55	1983	117
1924	30	1954	56	1984	115
1925	30	1955	57	1985	84
1926	29	1956	60	1986	73
1927	26	1957	65	1987	67
1928	25	1958	66	1988	72
1929	25	1959	71	1989	79
1930	24	1960	71	1990	80
1931	21	1961	69	1991	82
1932	17	1962	71		
1933	14	1963	75		
1934	15	1964	78		
1935	16	1965	84		
1936	17	1966	94		
1937	18	1967	100		
1938	19	1968	104		
1939	19	1969	109		
1940	20	1970	107		
1941	20	1971	108		

[a]Index numbers are calculated from data taken from USDA sources from January 1 to April 1 of each year. Index numbers from 1912 to 1976 are based on 1967=100, and index numbers from 1977 on are based on 1977=100.

[b]To compare the 1967=100 index values with the 1977=100 index values, the 1977 index number based on the 1967=100 index is 363.

SOURCE: J.T. Scott, Jr., professor of land economics and farm management, University of Illinois, Urbana, IL.

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Issue 91-10

July 1991

Farm and Family Living Income and Expenditures, 1987 through 1990

In 1990, the total noncapital living expenses of 408 farm families enrolled in the Illinois Farm Business Farm Management Association (FBFM) averaged $32,090—or $2,674 a month for each family (Table 1). This average was 12.6 percent higher than in 1989 and 21.3 percent higher than in 1988. Another $4,291 was used to buy capital items such as the personal share of the family automobile, furniture, and household equipment. Thus, the grand total for living expenses averaged $36,381 for 1990 compared with $32,820 for 1989, or a $3,561 increase per family. The average amount spent per family for capital items was $30 less, while noncapital expenses increased $3,591 per family. The sam-plefarms, which were mainly grain farms, were located primarily in central Illinois in a 15-county area bounded by Jacksonville, Peoria, Champaign, and Mattoon.

Figure 1 illustrates the annual capital and noncapital family living expenditures and income and social security tax payments for 1981 through 1990. Total family living expenses increased approximately 4 percent annually during this period. Income and social security tax payments increased the last four years (1987–1990) due to improved farm earnings, elimination of investment tax credit, and an increase in the social security tax rate.

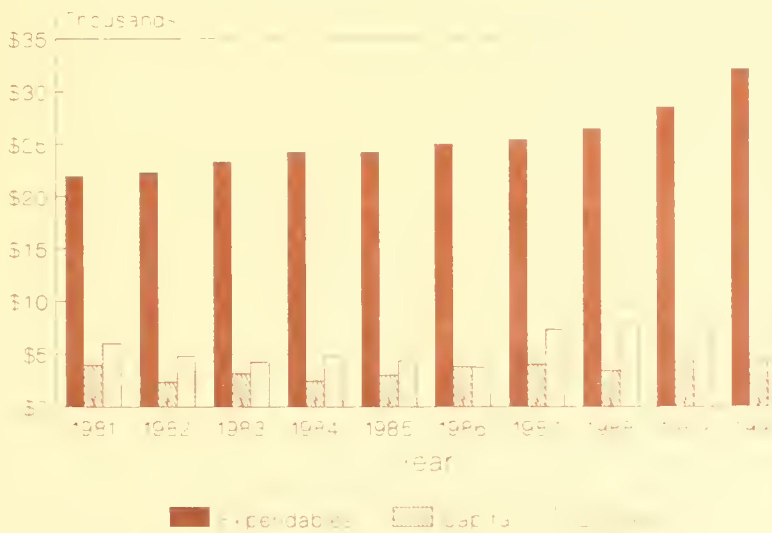

Figure 1. Noncapital and capital family living expenditures and income tax and social security payments, 1981 to 1990.

Table 1. Average Sources and Uses of Funds Over a Four-Year Period and by Noncapital Living Expenses for Selected Illinois Farms

	All records, average per farm				Family of 3 to 5, 1990[a]	
	1990	1989	1988	1987	High-third	Low-third
Number of farms in sample	408	402	365	328	89	89
Tillable acres farmed	719	709	661	665	865	610
Acres owned	120	119	116	119	102	110
Farm assets, January 1[b]	$358,394	$335,756	$321,422	$327,059	$376,341	$301,633
Farm assets, December 31[b]	384,363	355,420	303,897	326,706	410,277	328,407
Liabilities, January 1	183,161	175,939	187,670	203,647	233,642	128,147
Liabilities, December 31	203,168	182,841	175,131	199,282	259,553	145,491
Net farm income	50,825	45,047	17,438	36,388	61,958	43,710
Sources of dollars						
Net nonfarm income	$ 12,624	$ 10,502	$ 9,654	$ 8,682	$ 10,168	$ 11,180
Money borrowed	116,122	90,394	91,872	129,694	170,236	72,970
Farm receipts	180,737	156,717	163,138	176,181	232,552	159,413
Uses of dollars						
Interest paid	$ 15,070	$ 13,850	$ 12,907	$ 14,966	$ 19,933	$ 10,442
Cash operating expenses	112,943	97,737	101,802	111,011	148,804	102,067
Capital farm purchases	27,834	18,299	13,237	13,808	35,316	28,693
Payments on principal	98,101	85,797	104,689	134,024	147,152	58,963
Income and social security taxes	9,444	8,040	7,926	7,287	9,680	7,665
Net new savings and investment	9,710	1,070	-5,739	4,011	34	7,949
Living expenses						
Contributions	$ 1,260	$ 1,198	$ 1,049	$ 1,224	2,100	831
Medical	4,381	3,853	3,505	3,264	5,698	3,335
Insurance, life and disability	2,227	2,149	1,997	2,111	3,009	1,537
Expendables	24,222	21,299	19,888	18,840	35,623	17,159
Total noncapital expense	(32,090)	(28,499)	(26,439)	(25,439)	(46,430)	(22,862)
Capital	4,291	4,321	3,403	4,011	5,607	4,922
Total living expenses	$ 36,381	$ 32,820	$ 29,842	$ 29,450	$ 52,037	$ 27,784
Percentage change, total noncapital living expenses	12.6	7.8	3.9	1.9		

[a] Records were sorted into high- and low-third categories according to total noncapital living expenses.
[b] Modified cost basis except bare land values were held at current values between January 1 and December 31.

How these families use their funds depends somewhat on the levels of net income from farm and nonfarm sources and the priority of the expenditure. In this sample, the 1990 net farm income increased ($5,778 per farm) mainly due to improved livestock returns, while the net nonfarm income increased by $2,122 from 1989.

The amount of interest expense paid by each farm operator increased from $13,850 in 1989 to $15,070 in 1990. However, interest paid as a percentage of farm receipts actually decreased from 8.8 percent in 1989 to 8.3 percent in 1990. The 1990 figure of 8.3 percent is the second lowest percentage for any year during the last decade. The highest that this percentage has been during the 1980s was in 1983 when it was 15.3 percent. The lowest that the percentage has been was in 1988 when it was 7.9 percent. As a percentage of cash operating expenses, the interest paid decreased from 12.4 percent in 1989 to 11.8 percent in 1990. Farm receipts were $251 per tillable acre, an increase of $30 per tillable acre. They were at their highest level in 1987 when they were $265 per tillable acre. Cash operating expenses, including interest, increased $20 per tillable acre. Noncapital living expenditures per tillable acre increased $5 to $45 per tillable acre. During the 1980s, noncapital living expenditures have varied only $3 per tillable acre, ranging from $37 to $40. Machinery and building purchases increased from $18,299 in 1989 to $27,834 in 1990, and were at the highest level for farms in this study since 1979.

Debt-to-Asset Ratio Increases

The sample of farms showed an average debt of 53 cents for each $1 of farm assets as of December 31, 1990; machinery was valued at cost less depreciation. The debt for each $1 of assets was 51 cents on December 31, 1989. Both the value of farm assets and the amount of debt increased from the year before. This debt-to-asset ratio would be lower if machinery were valued at a current market value. Including nonfarm assets would also lower the ratio.

The farms in this sample were 57 acres larger than the average for the 7,500 farms in the FBFM record-keeping program. Crop yields averaged about 5 percent above those reported by the Illinois Crop Reporting Service. Operator's net farm income from this sample of farms was slightly higher than the average of all Illinois record-keeping farms. The average operator's net farm income for all Illinois record-keeping farms was $48,059 or $2,766 less than the average net farm income for this sample. The average living expenditures for farms in this sample are estimated to be 15 to 20 percent above the average of all Illinois farm operators having more than $40,000 gross sales per farm because the average net farm income for this sample is usually higher than the average for all farms.

In 1990, the average operator of these 408 farms was 44 years old. The average family had 3.6 members, with the oldest dependent child averaging 10 years old. The average operator farmed 719 tillable acres; 120 acres, or 17 percent of this land, was owned. The operators kept records so that all sources of funds, both farm and nonfarm, balanced with all uses of funds in a complete monthly cash-flow accounting system.

In the table, the averages per farm for total family living expenses are divided into five categories for 1987 through 1990. The "expendables" category includes cash spent for food, operating expenses, clothing, personal items, recreation, entertainment, education, and transportation. This category also includes selected itemized deductions such as the personal share of interest paid and real estate taxes. For 1988 and prior years, these items have been subtracted from net nonfarm income. Cash spent for capital improvements exceeding $250 is not included. The use of a rented house on an estimated 40 to 50 percent of the farms in this sample is not included because these data cover only cash outlays.

The excess on nonfarm taxable income over nonfarm business expense was $12,624 in 1990, or 35 percent of the total living expense; in 1989, the excess was 32 percent. It includes dividends on stocks, interest on savings and money-market funds, income from other nonfarm investments, and income from off-farm labor performed by family members. Interest earned and left in savings accounts not included in the cash flow is not reflected in the nonfarm income.

Assets and Liabilities Increase

The value of farm assets and the amount of liabilities for this sample of 408 farms increased when compared to a year earlier. The value of farm assets on December 31, 1990, was $28,943 more than a year earlier. The increase reflects primarily an increase in machinery purchases and a slight increase in land values. After declining for six years in a row, land values have increased in the past three years. At the same time, liabilities also increased by $20,007. These farm opeators borrowed $18,021 more than they made in principal payments for the year. The margin by which borrowings exceeded principal payments was the largest since 1981. The $27,834, or $39 per tillable acre, spent on capital purchases for machinery and equipment was the highest figure since 1979 when capital purchases averaged $52 per tillable acre.

Although at lower levels compared to earlier years in the decade, interest payments continue to be one of the highest farm expense items. The amount of interest paid in 1990 increased compared to 1989. Interest includes that amount paid on operating, intermediate, and real estate debt. Interest paid increased from 12 percent of total farm operating expense in 1979 to 21 percent in 1983 and dropped to 12 percent in 1990. The $15,070 interest payment in 1990 was 8.3 percent of total cash farm receipts, down from 8.8 percent in 1989.

High-Third/Low-Third Comparison

The records from farm families with three to five persons were sorted into three categories, according to their noncapital living expenses. The high third and the low third were then used to compare family living expenses. The total living expenses for the high-third group averaged $52,037, compared with $27,784 for the low-third group. Figure 2 illustrates total living expenses for these two groups for 1984 through 1990. The high-third group farmed 255 more acres than the other group and owned 12 percent of the land farmed; the low-third group owned 18 percent of the land farmed. The larger farms in the first group had more income for living expenses and to pay income tax. Net farm plus nonfarm income was $72,126 for the high-third group compared with $54,890 for the low-third group. The average age of operators in the high-third group was 41 and the number of family members was 4.2, compared with 39 years of age and 3.8 family members for the other group. Subtracting total living expenses and income and social security taxes paid from the total of net farm and nonfarm income results in a balance of $10,409 for the high-third group and $19,441 for the low-third group. Figure 3 illustrates this balance for these two groups for 1984 through 1990. It is interesting to note that although the low-third group had less income than the high-third group, they had more funds remaining after family living and tax expenditures.

Farm operations continue to grow in size. As these operations expand, more funds are flowing in and out of the businesses. More lenders are requiring cash-flow projections and continual monitoring of these projections. It is, therefore, important that more farmers learn how to balance and monitor cash flow each month. Computer program assistance is now becoming available in more service centers such as some FBFM Association district offices. These centers are prepared to offer services to help farmers project monthly cash flow on computer printouts so that they can compare projections with their actual results.

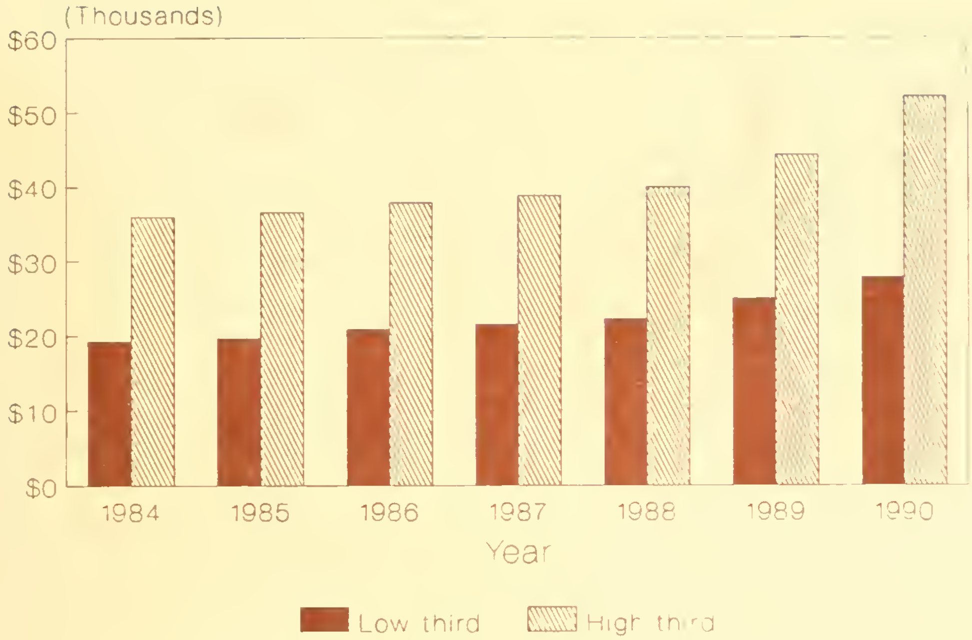

Figure 2. Total family living expenditures for families with three to five persons sorted into high-third and low-third groups according to noncapital living expenses, 1984 through 1990.

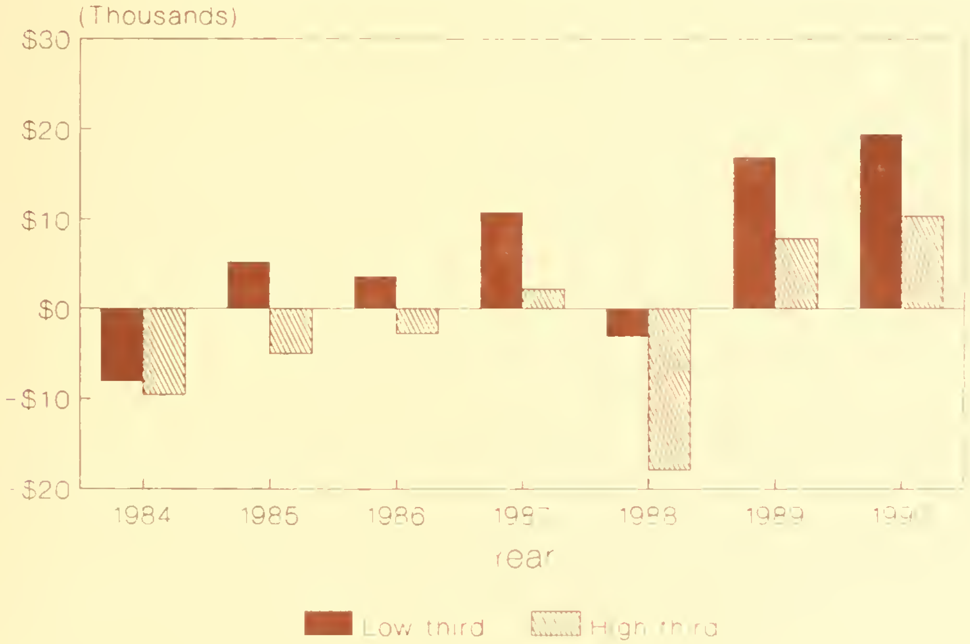

Figure 3. Average of net farm and nonfarm income less total family living expenses and income and social security taxes paid, sorted into high-third and low-third groups according to noncapital living expenses, 1984 through 1990.

For farm operators with low equity or very high debt-to-asset ratios, this type of accounting is essential. These operators need to account for all of their sources and uses of funds to assist them in making sound financial management decisions.

The data summarized in this process may also serve as a guide in budgeting allowances for family living expenses. For families in this sample, the family living expenses averaged $51 for each tillable acre farmed. If the net nonfarm income of $18 per tillable acre is used for living expenses, $33 per tillable acre would have to be generated from the farm business to meet family living requirements. Since 1983, this amount has varied only $4 per tillable acre, ranging from $29 to $33. Each family must determine how much each acre of crop or each litter of hogs should contribute to their family living expenses. This amount, when added to production costs and other obligations, can help to determine break-even prices needed for products sold.

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Issue 91-11 *July 1991*

Illinois's Test-Demonstration Program a Success

A recent study of the Illinois Tennessee Valley Authority (TVA) Test-Demonstration Farm Program shows that the program continues to be successful in accomplishing its main goals and objectives. The demonstration farms for this research, which covered the five-year period from 1983 to 1987, were located in Edwards, Jackson, and White counties. The counties worked with the TVA and the Cooperative Extension Service of the University of Illinois College of Agriculture to collect data for the program. The TVA financially supports the program.

The Test-Demonstration Farm Program emphasizes the "whole-farm approach" to management decisions and farm business operation. Farmers are selected for a five-year period to demonstrate the use of fertilizer and combinations of other resources that will contribute to increased income. The program has five major objectives, which are:

1. to introduce TVA experimental fertilizers and to demonstrate them in educational programs that promote more efficient fertilizer use;

2. to develop a complete, well-balanced, efficient, and profitable farm-business organization on each farm;

3. to encourage cooperators to manage their farms to provide evidence to other farmers of the results of improved practices, efficient enterprises, and profitable farm-business operations;

4. to use the "whole-farm" demonstrations as educational tools to develop agriculture in the community and in the county; and

5. to apply research results from the College of Agriculture to the program.

Background for the Study

Since 1953, the University of Illinois and the Tennessee Valley Authority have combined their resources, to conduct whole-farm test-demonstrations and extension educational programs to stimulate agricultural development. The results of the demonstration programs have been published in annual five- and 10-year reports. While these reports provide great detail on the profitability and efficiency of demonstration farms and, thus, the performance of the demonstration program over several years, more extensive analysis has provided a larger pool of information from which to determine the effectiveness of the demonstration program. One such extensive study was conducted in 1958 by Fay M. Sims; another was conducted in 1965 by Franklin P. Graham.

Therefore, in the framework of these two earlier studies, it was decided to update the literature on the performance of the Illinois demonstration program. The results of the comparative analysis of the profitability of test-demonstration farms in

Edwards and White counties, compared to similar data from a paired sample of record-keeping farms in the same area over the 1983 through 1987 test-demonstration period will be presented first. Then, results of a survey questionnaire rating the demonstration families' experiences in the program will be discussed.

Farm Pairings

Seven demonstration farms were paired with farms of similar size, organization, and quality of soil to determine the effect of their participation in the program on their measures of economic performance. The criteria for selecting the paired sample are shown in Table 1. As indicated by the ratio of the test-demonstrator selection criteria figures to those of the paired sample, nine of the 10 criteria were relatively close to 1.00. The only criterion showing the greatest difference was the percentage of feed fed with a ratio of 1.61.

Comparison of Profitability

Four farm business analysis measures that are related to profitability were used in the comparative analysis: (1) net farm income; (2) capital and management earnings; (3) operator's labor and management earnings; and (4) management returns. In order to summarize the distribution of the profitability measures for both groups of farms, the average for each of the measures was calculated as follows: (1) as an average of the first two years (period 1); (2) as an average of the last two years (period 2); and (3) as an average of all five years of the program (period 3). Organizing the data in this manner provided a way of comparing the progress of the test-demonstrators and the paired sample from the beginning to the end of the program period. It also provided a way to test for statistically significant differences between the means of the profitability measures for both groups of farms over a five-year period.

As shown in Table 2, each of the four profitability measures, on a per tillable acre basis, were higher for the test-demonstrators than for the paired sample during periods 1 and 2. The average net farm income and management returns per tillable acre--two key indicators of farm profitability--both showed greater percentage increases for the demonstrator group from period 1 to period 2 than for

Table 1. Farm Pairings by Selection Criteria as an Average of the 1983-1987 Demonstration Program

Criteria	Test[1]	Pair[2]	Ratio[3]
Number of grain farms	7	7	1.00
Total tillable acres	659	633	1.04
Total acres owned[4]	266	295	0.90
Total acres rented[4]	436	406	1.07
Soil productivity rating	55	54	1.02
Percent feed fed	10	6	1.61
Months of available labor	18	18	0.96
Gross value of farm product	$146,390	$137,964	1.06
Total capital investment (TKI)	807,139	800,515	1.01
TKI/tillable acre	1,268	1,280	0.99

[1]Test = test demonstrator.
[2]Pair = paired sample.
[3]Test divided by pair rounded to the nearest hundredth.
[4]Based on the 1985-1987 average.

the paired sample group. Average net farm income per tillable acre for the demonstrators went from $54.19 to $62.67 (nearly a 16 percent increase) from period 1 to period 2; whereas income for the paired sample group went from $40.26 to $45.40 (nearly a 13 percent increase) over the same periods. Management returns per tillable acre of the paired sample group increased by slightly over 83 percent (-$25.90 to -$4.37) from period 1 to period 2. However, the demonstrators' management returns per tillable acre went from -$10.40 to $9.04 from period 1 to period 2, representing nearly a 187 percent increase.

The 1983-1987 average net farm income and capital and management earnings of the test-demonstrators were found to be significantly greater than those of the paired sample at the 0.10 probability level (Table 3). Test-demonstrator operator's labor and management earnings and management returns for the 1983-1987 period were determined to be significantly greater than those of the paired sample at the 0.05 level.

Program Ratings

Test-demonstration families in Edwards, Jackson, and White counties were asked to complete a questionnaire after they had completed the demonstration program. Respondents were asked to rate their experiences in 10 aspects of the demonstration program as being "excellent," "very good," "good," "fair" or "poor." These ratings helped to determine if the five major objectives of the test-demonstration program were being attained.

The demonstrator responses for each of the three counties were combined to gain an overall evaluation of the demonstration program over the 1983-1987 program period (Table 4). The highest percentage of responses were in the "excellent" and "very good" strata for each of the 10 aspects evaluated. Furthermore, concerning all aspects surveyed, the "excellent" and "very good" strata were found to have a significantly greater mean number of responses than the other strata at the 0.05 probability level. Crop and fertility planning received the highest percentage ratings of "excellent"--72 percent--compared to all aspects evaluated and rated. Eleven of the 18 demonstrators

Table 2. Comparison of Profitability per Tillable Acre on the Test-Demonstration and Paired Sample Farms, 1983-1984 and 1986-1987

Profitability measure[1]	Period 1[2] Test	Period 1[2] Pair	Period 2[3] Test	Period 2[3] Pair	Percent change P_1 to P_2 [4] Test	Percent change P_1 to P_2 [4] Pair
Net farm income	$54.19	$40.26	$62.67	$45.40	15.65	12.77
Capital and management earnings	28.66	12.90	39.04	20.15	36.22	56.20
Operator's labor and management earnings	9.61	-2.17	32.68	19.50	240.06	998.62
Management returns	-10.40	-25.90	9.04	-4.37	186.92	83.13

Note: Test = test-demonstrator group.
Pair = paired-sample group.
[1]Expressed as the average value per tillable acre.
[2]Average of 1983-1984.
[3]Average of 1986-1987.
[4]Percentage change from period 1 to period 2: $(P_2 - P_1)/P_1 \times 100$.

Table 3. Comparison of Profitability per Tillable Acre on the Test-Demonstration and Paired Sample Farms, 1983-1987

Profitability Measure[1]	Period 3[2]	
	Test demonstrators	Paired sample
Net farm income[3]	\$57.36 (10.93)	\$42.19 (22.04)
Capital and management earnings[3]	32.75 (10.77)	16.14 (22.58)
Operator's labor and management earnings[4]	21.7 (16.41)	78.15 (22.02)
Management returns	40.21 (14.76)	-15.46 (21.94)

Note: Standard error of the estimates are in parentheses.
[1]Expressed as the average value per total tillable acres.
[2]Average of 1983-1987.
[3]Indicates means are significantly different at the 0.10 level.
[4]Indicates means are significantly different at the 0.05 level.

Table 4. Combined Test-Demonstrator Evaluations of the Demonstration Program, 1983-1987

Questions	Ratings of program experience					
	Excellent	Very good	Good	Fair	Poor	No response
What was your overall evaluation of:	*percent*					
1. Crop and fertility planning	72.2 (13)[1]	16.7 (3)	5.6 (1)			5.6 (1)
2. Summer tours	50.0 (9)	50.0 (9)				
3. Cash flow planning	55.6 (10)	22.2 (4)	16.7 (3)	5.6 (1)		
4. Newsletter	33.3 (6)	50.0 (9)	5.6 (1)			11.1 (2)
5. Annual summary reports	44.4 (8)	38.9 (7)	5.6 (1)	5.6 (1)		5.6 (1)
6. Follow-up visits	61.1 (11)	27.8 (5)	11.1 (2)			
7. Contact with other farm families	33.3 (6)	38.9 (7)	22.2 (4)	5.6 (1)		
8. Contact with state specialists	44.4 (8)	38.9 (7)	16.7 (3)			
9. Whole-farm business improvement	50.0 (9)	27.8 (5)	11.1 (2)	5.6 (1)	5.6 (1)	
10. Follow up reports for the five-year period	55.6 (10)	22.2 (4)	5.6 (1)			16.7 (3)

[1]Numbers in parentheses represent actual number of respondents.

rated follow-up visits as "excellent," just in front of the 10 demonstrators who rated cash flow planning and follow-up reports for the five-year period as "excellent." The lowest combined percentage of "excellent" and "very good" ratings--72 percent--was for contact with other farm families.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

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Certified Farmland Assessed Values for 1992

Trends in Property Tax Assessments

The principle underlying the property tax is that one measure of the ability to pay taxes is the value of property owned. Unlike other taxes, the base of the property tax is not established by a market transaction. The taxable value of property or the assessed value is determined by an assessment process carried out by local assessing officials following state law and guidelines provided by the Department of Revenue. While there is no direct market transaction that is the base for the taxable value of property, economic conditions are very important to the size of the property tax base in any county and to changes that occur in that base over time. This is true when assessments are based on the market or when they are based on the income capitalization approach to value, as in the case of farmland. Assessed value in a county increases because new properties are added to the tax rolls when there is economic and population growth and when existing property increases in value. Assessed value declines when the value of property in a county drops and no new property is added to the tax rolls because of stagnant economic conditions.

The performance of the Illinois economy during the 1980s directly affected the change in the assessed value of real property in the state. Not all sectors of the economy experienced the same level of performance during the last decade. Consequently, the assessed value of property changed at different rates in different regions. Table 1 presents the percent change in equalized assessed value between 1981 and 1988 (the most recent data that is available) for various types of property for five types of areas in Illinois. For example, the assessed value of all property in Cook County increased 51.6 percent between 1981 and 1988. Assessed values in the five Chicago suburban counties increased 84.3 percent. These changes reflect the relative strong economic growth experienced in suburban Cook and the five suburban counties of Chicago in the 1980s. Assessment increases of this magnitude, combined with ever higher tax rates, underlie the political pressure for property tax relief in the Chicago area. The General Assembly enacted a 5 percent cap on property tax increases in the five suburban counties and a one-year freeze on assessments in Cook County as part of the FY92 state budget agreement.

In contrast to the Chicago area, assessed values in downstate urban counties and rural counties decreased 5.3 percent and 8.2 percent, respectively, between 1981 and 1988. Central to the changes in assessed values in downstate Illinois in the 1980s was the economic performance of the manufacturing sector and agriculture. The heavy manufacturing sector, dominant in downstate urban counties, experienced significant stress in the 1980s, as did agriculture. The industrial tax base and the agricultural tax base mirror this stress. The rural counties experienced a 32.9

Table 1. Percent Change in Equalized Assessed Value by Type of Property and by Area of Illinois, 1981 to 1988[a]

Area of Illinois	Type of property				
	Industrial	Commercial	Residential	Farm	All property
			percent		
Cook County	52.3	66.3	41.0	-39.3	51.6
5 Chicago-area suburban counties	101.7	91.7	47.9	-16.9	84.3
East St. Louis-area counties	13.6	32.1	19.3	-60.8	15.9
Downstate urban counties	-10.0	10.7	-4.1	-36.8	-5.3
Rural counties	37.5	5.1	-2.0	-32.9	-8.2
All Illinois	51.3	56.0	29.6	-31.4	31.2

Source: *Illinois Property Tax Statistics*, 1988 and 1981, Illinois Department of Revenue, Springfield, Illinois.
[a]Changes are in current dollars. Inflationary price changes have not been considered.

percent loss in farm assessed valuation between 1981 and 1988. Similar losses in the industrial tax base were experienced in Peoria County (-39 percent), Macon County (-32 percent), and Rock Island County (-29 percent). The poor performance in the basic industries limited economic and population growth and placed downward pressure on the assessed value of residential property in rural and downstate urban counties.

Future changes in assessed values will depend on the performance of the Illinois economy. The forces of the marketplace will be different in different regions and in different economic sectors. There is no reason to expect changes in assessed value of farm property to mirror changes in the assessed value of industrial property or commercial property. The value of these properties will reflect the economic conditions in the respective sectors.

1992 Certified Assessments by Soil Productivity Index

Table 2 presents the per-acre certified assessed value of cropland that assessing officers use to determine the 1992 assessed value of farmland throughout Illinois. The 1992 assessments will be the base for taxes paid by farmland owners in 1993. The index ranges from 60 to 130, and the 1992 certified values range from $8.07 to $293.51. The assessor applies the appropriate certified value in calculating the taxable value of farmland in each farm tax parcel after determining the soil index for the parcel and the use of the land in farming. The certified farmland assessed values for 1991 are also included in Table 2 for comparison purposes.

The 1992 certified values in Table 2 are either 110 percent of the values certified in 1991 (values for productivity indexes of 60 to 119) or the 1992 values calculated using the use-value formula (values for productivity indexes 120 and above). The limit law passed in 1986 restricts the change in certified values to 10 percent from one year to the next. Between 1986 and 1991, the limit law determined certified values, limiting the decrease in certified values from one year to the next to 10 percent. The 1991 certified values were partially determined by the limit law and partially by the use-value formula, depending on the productivity index. However, 1991 certified values were less than 1990 certified values.

Table 2. 1991 and 1992 Certified Farmland Equalized Assessed Values (EAV) by Soil Productivity Index

Productivity index (average manage-ment)[a]	1991 certified EAV[b]	1992 certified EAV[c]	Productivity index (average manage-ment)[a]	1991 certified EAV[b]	1992 certified EAV[c]
	--------dollars per acre---------			----------dollars per acre---------	
60	7.34	8.07	96	93.54	102.89
61	7.94	8.73	97	98.02	107.82
62	8.55	9.41	98	112.84	112.84
63	9.14	10.05	99	107.21	117.93
64	9.74	10.71	100	111.86	123.05
65	10.33	11.36	101	116.61	128.27
66	10.94	12.03	102	121.41	133.55
67	11.53	12.68	103	126.22	138.84
68	12.13	13.34	104	131.11	144.22
69	12.72	13.99	105	136.07	149.68
70	13.32	14.65	106	141.45	155.60
71	13.91	15.30	107	147.43	162.17
72	16.45	18.10	108	153.42	168.76
73	18.99	20.89	109	159.40	175.34
74	21.52	23.67	110	165.38	181.92
75	24.05	26.46	111	171.36	188.50
76	26.58	29.24	112	177.34	195.07
77	29.12	32.03	113	183.31	201.64
78	31.64	34.80	114	189.29	208.22
79	24.17	37.59	115	195.26	214.79
80	36.71	40.38	116	201.25	221.38
81	39.24	43.16	117	207.23	227.95
82	41.77	45.95	118	213.20	234.52
83	44.29	48.72	119	219.19	241.11
84	46.84	51.52	120	225.16	246.10
85	49.37	54.31	121	231.14	250.67
86	51.89	57.08	122	237.11	255.30
87	55.44	60.98	123	243.09	259.96
88	59.46	65.41	124	249.08	264.65
89	63.48	69.83	125	255.05	269.34
90	67.63	74.39	126	261.03	274.09
91	71.83	79.01	127	263.01	278.91
92	76.04	83.64	128	272.99	283.75
93	80.33	88.36	129	278.97	288.60
94	84.65	93.12	130	284.95	293.51
95	89.07	97.98			

Source: Illinois Department of Revenue, Certification Memos, 1989 and 1990.

[a]Average management productivity index is the average of the basic and the high-level management indexes as reported in *Soil Productivity in Illinois*, Illinois Cooperative Extension Service Circular 1156, 1978.

[b]90 percent of 1990 certified values for productivity index figures 60 to 86 and 106 to 130; actual 1991 calculated values for productivity index figures 87 to 105.

[c]110 percent of 1991 certified values for productivity index figures 60 to 119; actual 1992 calculated values for productivity index figures 120 to 130.

Comparison of 1991 and 1992 certified values in Table 2 indicates an increase in certified values for all soil productivity indexes, with the increase for indexes of 60 to 119 limited to 10 percent by the 1986 limit law. The 1992 calculated values for indexes of 120 to 130 were less than 10 percent greater than the 1991 certified values, so they are not subject to the limit law.

This is a rather confusing situation. What is causing the shift from declining use-values to increasing use-values, with some increases exceeding 10 percent and triggering the imposition of the limit law, restricting the increase? The farm economy has not been static in the past few years. Several changes have affected the cost of production and the revenues from crop production. The interaction between the 10 percent limit law and changes in the Illinois farm economy have resulted in the upward movement in certified values between 1991 and 1992, with most of the certified values constrained by the 10 percent law.

Some insight into the underlying causes of the change in certified values is provided by looking at the factors that are used in calculating use-value assessments. The assessment formula used to calculate certified values uses five-year average data. Calculations are done for each soil productivity index. Commodity prices are one of the major factors influencing the calculations. The five-year average prices for the major commodities used in the assessment calculations are presented in Table 3 for each assessment year since the adoption of the Illinois Farmland Assessment Law Amendment in 1981. The 1992 calculation uses crop price averages for the period 1986 through 1990. These per-bushel prices are: corn, $2.18; soybeans, $6.04; wheat, $3.20; and oats, $1.69. The five-year average commodity prices are very similar for the 1985-1989 period (1991 assessments) and the 1986-1990 period (1992 assessments).

The upward pressure on certified values in 1992 comes mainly from lower production costs and a smaller capitalization factor used in the calculations. The average production costs were somewhat lower in the 1986-1990 period, compared to the 1985-1989 period. Lower production costs put upward pressure on assessment calculations.

In addition to lower average production costs, lower interest rates, used as the capitalization factor in the assessment calculations, put additional upward pressure on the calculation of use-values in 1992. Table 4 contains the five-year average mortgage interest rates for farmland, employed as the capitalization factor in the assessment calculations for assessment year 1982 through assessment year 1992. The combination of relatively stable commodity prices, lower production costs, and lower interest rates (capitalization factor) resulted in calculated

Table 3. Five-Year Average Crop Prices, 1981 to 1988

Five-year period	Assessment year	Corn	Soybeans	Wheat	Oats
1976-1980	1982	$2.39	$6.53	$3.17	$1.41
1977-1981	1983	2.48	6.81	3.34	1.52
1978-1982	1984	2.55	6.62	3.52	1.64
1979-1983	1985	2.73	6.73	3.61	1.77
1980-1984	1986	2.87	6.76	3.53	1.85
1981-1985	1987	2.82	6.49	3.36	1.87
1982-1986	1988	2.63	6.10	3.16	1.73
1983-1987	1989	2.46	5.96	3.07	1.68
1984-1988	1990	2.32	6.04	3.08	1.75
1985-1989	1991	2.19	5.96	3.21	1.77
1986-1990	1992	2.18	6.04	3.20	1.69

Source: Illinois Crop Reporting Service.

certified values for 1992 being higher than certified 1991 values. For soil productivity indexes of 60 to 119, the increase was more than 10 percent, triggering the 10 percent limit law.

Future Trends in Farmland Assessments

With the strengthening of the farm economy, the calculated assessed values reversed their past downward trend and increased in 1992 for the first time since the recession of the early 1980s. This reversal and the impact of the 10 percent limit law on certified values can be seen in Figure 1, where the certified and the calculated assessed values for a soil with a soil productivity index of 120 are presented as an index (1981 value equals 100). Before the 1986 assessment year, the calculated and the certified values were the same. The 1986 limit law required the use of 1986 values in both 1986 and 1987 and then restricted the change to 10 percent per year as the assessments were adjusted downward, incorporating the extremely stressed economic conditions in Illinois agriculture during the early 1980s.

The index value of 57 for assessment year 1992 shows the impact of strengthening economic conditions (1991 index of 52) and, that for the soil productivity index of 120, the certified and the calculated values for 1992 are the same. The lower line on the figure, before assessment year 1992, represents the actual calculated assessed values, while the top line before this assessment year represents the certified values. The figure illustrates that it took six years for the poor economic conditions experienced in Illinois agriculture during the early 1980s to be assimilated into the farmland tax base. During this entire period the 10 percent limit law held farmland assessments *above* the level determined by economic conditions in farming. Thus, during this six-year period, property taxes on farmland were probably higher than they would have been otherwise. Holding farmland assessments and farmland property taxes above the level dictated by economic conditions to protect rural school tax bases, allowing the assimilation of the farm recession over a period of years, was the main objective of the 1986 limit law.

The information presented in Figure 1 indicates that the upward pressure on assessments will continue into the 1993 assessment year with the possibility of some stabilization in 1994 and beyond. However, the exact extent of the upward pressure will depend somewhat on the soil productivity index. For soils with indexes of 60 to 119, 1993 assessments will reflect the increase in 1992 calculated values above 10 percent not included in the 1992 certified values. For the other soil indexes, the upward pressure will likely be less because all of the increase calculated in 1992 is reflected in the 1992 certified values. The projection in Figure 1 for assessment year 1993 shows a small increase.

The change in assessments beyond the 1993 assessment year will depend on the economic conditions in agriculture and the impact of assessment policies, such as the 10 percent limit law. Farmland assessment stabilization and strengthening is welcome news to rural school officials and the officials of other rural, local governments dependent on farm property for tax revenues. However, the farm property tax base is not likely to ever regain the level of the early 1980s. The farm economy will not support a tax base twice the current level. The economic conditions in agriculture in the 1990s bear no resemblance at all to the conditions of the late 1970s and early 1980s. Keep in mind that the economic conditions in agriculture will determine the level of assessments on farm property in Illinois, but that these will be tempered by the limit law. The limit law provides some stability for both taxing districts and farmland property taxpayers.

Table 4. Five-Year Average Mortgage Interest Rates for Farmland[a]

Five-year period	Assessment year	Rate (percent)
1976-1980	1982	9.77
1977-1981	1983	10.37
1978-1982	1984	11.71
1979-1983	1985	11.93
1980-1984	1986	12.44
1981-1985	1987	12.65
1982-1986	1988	12.82
1983-1987	1989	11.91
1984-1988	1990	11.50
1985-1989	1991	11.10
1986-1990	1992	10.73

[a]Interest rates used as capitalization factor in farmland assessment computations.

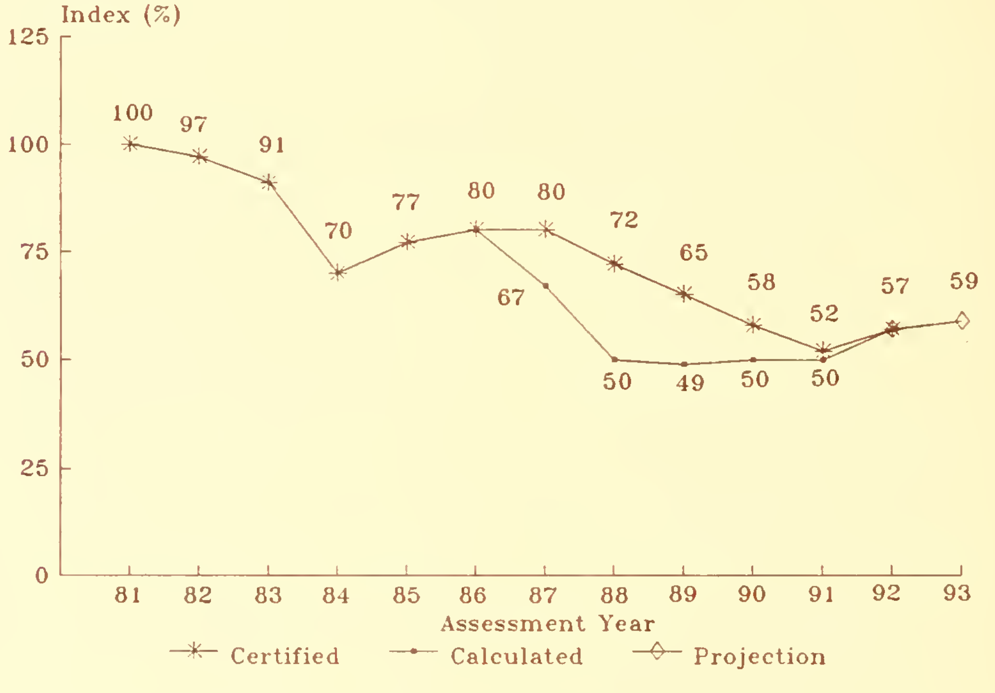

Figure 1. Index of certified and calculated assessed values for soils with a productivity index of 120, 1981 to 1992, with projection for 1993.

The economic realities of the farm property tax base in Illinois provide little consolation to rural school boards challenged with financing school services. School financing remains one of the most difficult challenges facing the Illinois General Assembly and the governor. Balancing funding needs for schools, pressure for property tax relief in the suburban areas of Chicago, and a permanently diminished rural property tax base will challenge the statesmanship of elected officials across the state.

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FARM ECONOMICS Facts & Opinions

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Retail Sales in Illinois, 1988-1989: Is the Rural Decline Slowing?

The Importance of Retail Trade in Illinois

Trends in local retail sales are important for at least two reasons: they reflect general conditions in local economies, and they are directly proportional to sales tax revenues. With widespread focus on the economic vitality of towns and cities in downstate Illinois, particularly in rural areas, and with concern about state and local budgets, it is important to understand developments in retail activity in Illinois.

Detailed economic data for Illinois towns that lie outside of Chicago and downstate metropolitan areas are not well publicized. Unemployment rate data are one of the few data series available that give current indications of overall economic conditions downstate. However, even these data are for counties. It is difficult to find current data for towns and cities, especially for those in rural counties.

This issue of *Farm Economics Facts and Opinions* describes recent trends in retail sales for all towns and cities in Illinois. Data for 1988 and 1989 are presented. Retail sales are calculated from sales tax receipts collected by the Illinois Department of Revenue. Tax receipts were collected from 1,236 towns and cities in Illinois. However, data for 47 small towns that straddle county lines are represented twice because tax receipts for different county sections of a town are kept distinct in Department of Revenue data. Thus, there are 1,283 observations here. All data are adjusted for inflation using the Consumer Price Index and are stated in 1989 dollars.

Description of Retail Sales in Illinois

Tables 1 and 2 show the major trends in retail sales over this recent two-year period. Table 1 presents data for the state and for the northern, central, and southern thirds of Illinois. Table 2 presents data by county type and economic base. The "Chicago collar" represents towns in the six-county region surrounding the city of Chicago (Cook, DuPage, Kane, Lake, McHenry, and Will counties). "Downstate metropolitan" towns are towns in all other metropolitan counties in Illinois. "Rural agricultural" towns are towns in nonmetropolitan counties in which agriculture is the dominant industry. For these counties, 20 percent or more of income comes from agriculture. "Rural manufacturing" towns are towns in nonmetropolitan counties in which manufacturing is the dominant industry. For these counties, at least 20 percent of income comes from manufacturing. "Rural diversified" towns are towns in those counties where no one economic sector dominates the county. Data for unincorporated areas are excluded, although these represent a small percentage of sales in Illinois.

Table 1. Retail Expenditures by Region of State

Region of state	Number of towns	Total retail expenditures in 1988 (millions of 1989 $)	Total retail expenditures in 1989 (millions of 1989 $)	Percentage change, 1988-1989	Median percentage change, 1988-1989
North	550	60,380.9	59,671.2	-1.18	-0.93
Central	365	9,852.2	9,859.0	0.07	-1.07
South	368	6,682.0	6,734.5	0.79	-0.56
Total Illinois	1,283	76,915.2	76,264.7	-0.85	-0.89

Note: Regions of the state are based on Illinois Cooperative Extension Service (CES) regions. "North" is defined as CES regions 1, 2, and 3, and ranges from Jo Daviess and Lake counties (north) to Henderson and Kankakee counties (south). "Central" is defined as CES regions 4 and 5, and ranges from Hancock and Iroquois counties (north) to Pike and Clark counties (south). "South" is defined as CES regions 6 and 7, and ranges from Calhoun and Crawford counties (north) to Alexander and Massac counties (south).

Table 2. Retail Expenditures by County Type or County Economic Base

County type or economic base	Number of towns	Total retail expenditures in 1988 (millions of 1989 $)	Total retail expenditures in 1989 (millions of 1989 $)	Percentage change, 1988–1989	Median percentage change, 1988–1989
Chicago and collar	275	52,795.1	52,110.9	-1.30	-0.21
Downstate metropolitan	194	10,340.7	10,349.6	0.09	0.35
Rural manufacturing	217	4,969.6	5,012.0	0.85	-1.89
Rural agricultural	291	3,367.3	3,337.1	-0.90	-2.48
Rural diversified	306	5,442.6	5,455.1	0.23	-0.73

Note: County types are defined in the text.

Table 3. Retail Expenditures by Town Size

Town size	Number of towns	Total retail expenditures in 1988 (millions of 1989 $)	Total retail expenditures in 1989 (millions of 1989 $)	Percentage change, 1988-1989	Median percentage change, 1988-1989
0-250	119	26.9	29.1	8.28	-3.68
251-500	217	202.7	187.5	-7.46	-3.97
501-2500	510	3,719.2	3,767.6	1.30	-0.66
2501-5000	123	3,359.7	3,382.1	0.67	0.74
5001-10,000	105	7,459.0	7,365.8	-1.25	-0.23
10,001-15,000	54	6,432.1	6,499.0	1.04	-0.06
15,001-20,000	41	5,856.5	5,764.2	-1.58	-2.09
20,001-25,000	23	4,953.5	4,720.2	-4.71	-2.41
25,001-50,000	49	15,430.8	15,242.0	-1.22	-1.27
50,001-100,000	21	11,754.4	11,693.7	-0.52	-0.99
100,001+	4	17,433.2	17,231.3	-1.16	-0.20

Table 4. Retail Expenditures by Town Size and Business Category

Town size	General merchandise		Food		Drinking and eating places		Apparel	
	1989	% Δ[a]	1989	% Δ	1989	% Δ	1989	% Δ
0-250	1.4[b]	4.15	1.6	-1.28	6.8	2.68	.0	-98.16
251-500	7.2	-12.14	8.8	0.63	23.9	-4.84	.2	-6.46
501-2,500	377.6	-2.02	210.8	0.31	303.4	-0.59	118.1	0.11
2,501-5,000	280.0	0.74	206.7	1.15	296.4	4.14	87.0	-6.55
5,001-10,000	1,107.2	-7.90	316.2	-1.24	640.7	-1.33	356.8	-4.79
10,001-15,000	1,097.3	2.63	312.1	6.45	556.5	-1.27	371.8	0.08
15,001-20,000	719.2	8.10	282.5	-2.89	488.6	-1.29	183.3	-4.24
20,001-25,000	526.7	-3.24	202.5	-4.54	421.5	1.79	229.4	-3.38
25,001-50,000	2,212.9	-6.83	684.6	0.87	1,265.3	-0.63	746.4	-1.30
50,001-100,000	1,756.8	-4.35	447.3	-1.16	970.3	-0.61	683.4	-4.22
100,001+	2,104.8	-2.52	676.3	-0.70	2,405.7	-3.51	1,121.7	-1.56
Total Illinois	10,218.7	-4.18	3,371.6	0.09	7,412.0	-1.35	3,890.4	-2.41

Town size	Household and furniture		Lumber, building, and hardware		Automotive and filling stations	
	1989	% Δ	1989	% Δ	1989	% Δ
0-250	0.4	15.22	1.9	9.57	6.6	-3.64
251-500	3.1	-16.87	33.2	-18.48	42.9	-1.81
501-2,500	124.9	-7.05	393.4	-1.73	962.4	4.93
2,501-5,000	84.2	-8.05	330.9	-6.96	951.8	0.90
5,001-10,000	295.1	0.86	593.3	7.09	1,608.7	-1.90
10,001-15,000	211.1	-3.78	458.0	-0.17	1,453.6	-2.70
15,001-20,000	202.4	6.09	555.2	-1.17	1,385.9	-2.77
20,001-25,000	147.3	-3.47	406.8	-0.52	1,069.1	-6.97
25,001-50,000	699.2	-1.98	1,257.5	-0.36	3,522.9	-4.57
50,001-100,000	511.9	-4.31	932.0	-2.56	2,723.6	-5.71
100,001+	795.5	-1.97	1,214.9	-0.57	2,440.8	-6.85
Total Illinois	3,084.4	-2.18	6,209.3	-0.57	16,274.9	-3.77

[a]% Δ means percentage change.
[b]Dollars are in millions of 1989 dollars.

Inflation-adjusted retail sales fell by 0.8 percent in towns and cities in Illinois from 1988 to 1989. During this period, real gross state product rose 1.1 percent and real total personal income in Illinois rose 2.8 percent. Thus, retail activity failed to keep pace with overall economic activity in the state.

Real retail sales declined by 1.2 percent in towns in northern Illinois, mainly due to a 1.3 percent decline in sales in Chicago and in towns in its collar counties. Sales also declined in towns in rural agricultural counties by 0.9 percent. However, towns in most other parts of the state saw gains, especially in southern Illinois and in rural manufacturing counties. Sales increased slightly in towns in central Illinois, in downstate metropolitan counties, and in rural diversified counties.

Despite modest gains outside of Chicago, change for the median town was negative in most categories. Change for the median town in Illinois was -0.89 percent. In other words, 641 towns had growth rates higher than -0.89 percent, and 641 towns had growth rates lower than -0.89 percent over this period. The median was also negative in the northern, central, and southern thirds of Illinois. And, except for towns in downstate metropolitan counties, the median town experienced a decline in all other county types (Table 2).

These results indicate that total sales gains in towns in central and southern Illinois were concentrated in the larger towns in these regions. However, the situation was reversed in downstate metropolitan areas: smaller towns were outgrowing the larger towns and cities. Similarly, in the Chicago area the smaller towns were declining at a slower rate than larger towns and cities.

Table 3 presents data by town size. Overall, the larger towns (15,000 population or more) experienced declining sales. However, very small towns (less than 250 population), small towns (500 to 5,000), and small cities (10,000 to 15,000) experienced gains. In all but one case, however, the median town in each size category experienced declining sales.

Table 4 presents detailed results by town size and major sales category. For towns in the state overall, these categories represent the following percentages of total sales in 1989: automotive and filling stations (21.3 percent), general merchandise (13.4 percent), drinking and eating places (9.7 percent), lumber, building, and hardware (8.1 percent), apparel (5.1 percent), food (4.4 percent), and household and furniture (4.0 percent). Remaining sales are miscellaneous or unallocated to specific categories. Most towns lost automotive-related sales, except small towns between 500 to 5,000 in population. Similarly, most towns lost general merchandise sales, especially small towns between 250 and 500 people, where sales fell 12 percent. Sales at drinking and eating places also slipped in all but three categories and for all categories with populations larger than 25,000. The same is generally true for lumber, building, and hardware sales, apparel sales, and household and furniture sales. The 98 percent decline in apparel sales in very small towns (less than 250 people) is especially dramatic. Of the seven categories reported here, only food experienced an increase in sales.

Summary and Conclusions

The results of this study are summarized as follows:

1. Inflation-adjusted retail sales fell in Illinois towns and cities by 0.8 percent from 1988 to 1989. However, the decline was concentrated in Chicago and in towns in its collar counties (-1.3 percent). Sales rose modestly in towns in southern Illinois (0.8 percent) and in central Illinois (0.1 percent).

2. The median town experienced a modest decline in sales in each region of the state (north, central, and south), and for most types of county (Chicago and collar, rural manufacturing, rural agricultural, and rural diversified). Only the median town in downstate metropolitan areas experienced a gain in sales.

3. Total sales rose in very small towns (less than 250 people), in small towns (500 to 5,000 people), and in small cities (10,000 to 15,000 people). They fell everywhere else, especially in small towns with 250 to 500 people. However, the median town in most categories experienced lower sales.

4. For seven categories representing 66 percent of 1989 town expenditures, sales declined in all categories except food. For cities over 15,000, sales generally declined in all seven categories. For towns less than 15,000 people, results are mixed: sales rose for some spending categories for some town sizes but fell in other cases.

From these results, it appears that the dramatic changes observed in an earlier work (*Farm Economics Facts and Opinions* 90-12) are slowing down. Trends for 1977 to 1988 indicate large declines in inflation-adjusted retail sales for most towns outside of the Chicago metropolitan area, especially for small rural towns, and gains for the collar counties. Results for 1988 to 1989 indicate that the smaller towns, especially in southern and central Illinois, did better than towns and cities around Chicago. Towns and cities in downstate metropolitan areas also grew more than towns and cities in the Chicago metropolitan area. Within the Chicago metropolitan area, it looks like the five collar counties are continuing their pattern of outgrowing Cook County. In general, however, even where sales grew, they grew more slowly than state output and personal income.

Trends in retail sales are important. In both urban and rural Illinois, the retail trade sector is one of the top three employers (the other two are services and manufacturing). Consequently, changes in total retail sales will affect employment in an important sector in the state's economy. Also, sales tax revenue is directly proportional to retail sales. Unless sales tax rates rise or unless the sales tax base is increased, slow growth in retail sales means that state and local governments will be unable to depend on growth in sales tax receipts to balance budgets in coming years.

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FARM ECONOMICS Facts & Opinions

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Issue 91-14 *September 1991*

Farm Property Taxes Flat in 1990

Property tax reform remains high on the agenda of Governor Jim Edgar and of state legislative leaders. Of course, property tax reform means different things to different people. To some, it means a lower property tax bill; to others, it means a reduction in or the elimination of increases in property taxes; to still others, it means significantly higher levels of state funding for local schools. All these views are valid. Property tax reform is in the eyes of the beholder!

Property tax issues were definitely a major part of the state budget compromise reached in July between the leaders of the General Assembly and Governor Edgar. A cap on the growth in property tax extensions of 5 percent (or the rate of inflation, whichever is higher) for the Chicago area was part of the budget compromise. Reforms such as the growth cap are very, very cosmetic changes. Serious reform will involve the state assuming a greater role in funding local schools across Illinois. Given the very difficult financial conditions facing Illinois state government this fiscal year and the projected difficulties next fiscal year, the likelihood of continued cosmetic changes looms large. Serious state/local government finance reform will definitely be put off to another day—at least until after the 1992 general election.

While the debate over property taxes in Illinois is not new, the tone of the discussions have taken on new vigor. Information about the property tax and the state/local government finance system has never been more important. The average per-acre tax paid on Illinois grain farms presented in Figures 1, 2, and 3 provide an excellent historical view of farm property taxes in Illinois.

The average per-acre tax paid on Illinois grain farms has been virtually the same for the last three years: $14.98 in 1988, $14.99 in 1989, and $15.01 in 1990. The average taxes paid are based on 1987, 1988, and 1989 farm assessments, respectively, and will be used to fund rural school and other local government budgets in fiscal years 1989, 1990, and 1991. Of course, property taxes are the outcome of multiplying the property tax rate by assessed valuations. If local government and school spending increases, assessed valuations decrease, and other sources of funding such as state school aid remain the same, the property tax rate will increase to maintain spending. Accordingly, the property tax is the residual budget-balancing revenue source of schools and local governments.

Since 1987, the assessed valuation on farmland in Illinois has been declining because of the poor economic performance of the agricultural sector in the 1980s. To experience the type of average per-acre change presented in Figure 1, there had to be significant pressure on the average farm property tax rate. At the beginning of the 1980s, the average farm property tax rate (outside of Cook County) was 4.66 percent. In 1988, the most recent year for which data are available, the average rate had

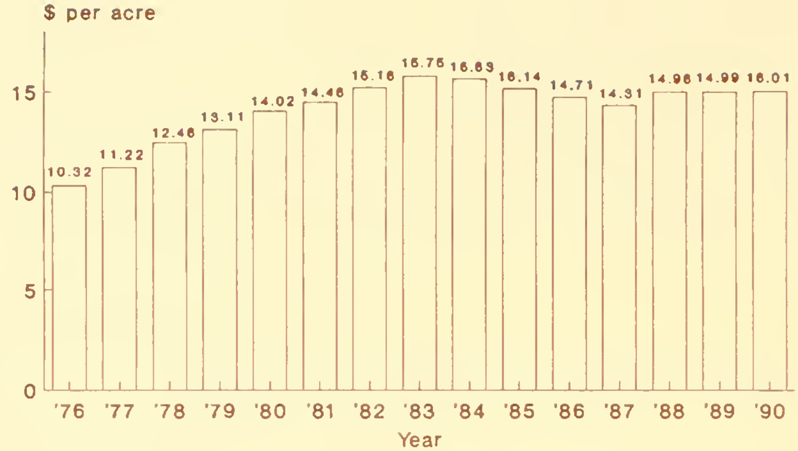

Figure 1. Per-acre property taxes on Illinois grain farms, 1976 to 1990.

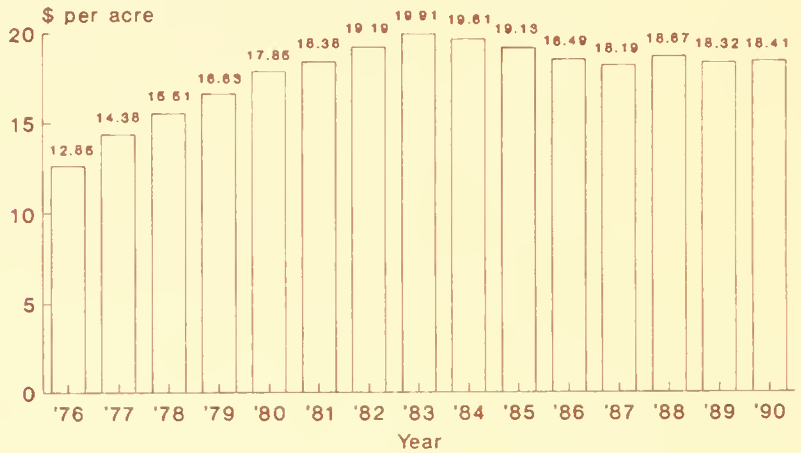

Figure 2. Per-acre property taxes on northern and central Illinois grain farms, 1976 to 1990.

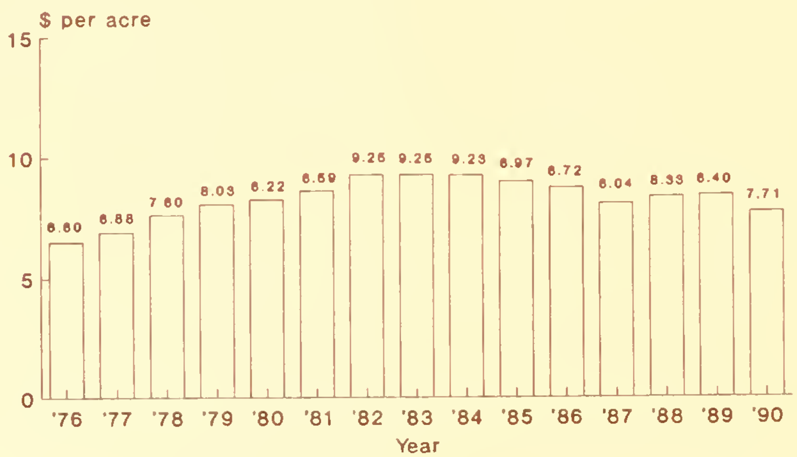

Figure 3. Per-acre property taxes on southern Illinois grain farms, 1976 to 1990.

increased 36 percent to 6.34 percent. During the rest of the 1990s, per-acre property taxes on Illinois farms will reflect the interplay of relatively stable to somewhat strengthened certified farmland assessed values and the continued upward pressure on farm property tax rates, driven primarily by rural school taxes.

Per-Acre Taxes Across the State

Figure 1 shows per-acre property taxes for a sample of Illinois grain farms from 1976 to 1990. Data for the sample in the 68 northern and central Illinois counties and the 34 southern Illinois counties are also included in Figures 2 and 3. In 1990, the sample included 2,124 grain farms, totaling 1.72 million acres.

The gap between average per-acre tax payments in southern Illinois and northern and central Illinois continues. In fact, in 1990 the gap widened somewhat as per-acre taxes paid on grain farms in southern Illinois declined $0.69 between 1989 and 1990, while the per-acre taxes paid on grain farms in central and northern Illinois increased slightly. In 1987, southern Illinois taxes per acre were 56 percent of the state average. In 1990, they were 51 percent of the state average.

The historical difference in the level of per-acre property taxes in the two regions of Illinois reflects the poor-quality soils in southern Illinois compared to the other regions of the state; this results in lower farmland assessed valuations. Generally, farm property tax rates are lower in southern Illinois as well. The gap was widened in 1990 because property tax rates on farm property in southern Illinois did not increase enough to offset the decline in farm assessments. In the other regions of the state, rate increases more than offset decreases in assessments.

Effective Tax Rates and Tax Payments

One of the better methods for comparing the property tax burden on Illinois farms is the effective property tax rate. The **effective** property tax rate is simply the ratio of property taxes paid to the market value of farmland. Effective rates for the last 15 years for Illinois and the northern and southern regions of the state are shown in Table 1. Between 1976 and 1982, the rate for Illinois decreased from 0.96 to 0.56, a decline of 42 percent. During this period, the market value of farmland, driven by the extraordinary inflationary pressures of the 1970s, increased significantly faster than the property tax

Table 1. Effective Property Tax Rates on Illinois Farms, 1976 to 1990

	Effective tax rate, percent[a]		
Tax year	Northern and central Illinois	Southern Illinois	Illinois
1976	1.02	0.88	0.96
1977	0.93	0.75	0.86
1978	0.74	0.62	0.72
1979	0.72	0.59	0.68
1980	0.69	0.54	0.65
1981	0.60	0.49	0.56
1982	0.58	0.51	0.56
1983	0.66	0.56	0.64
1984	0.85	0.72	0.82
1985	0.99	0.84	0.95
1986	1.11	0.94	1.07
1987	1.31	0.92	1.20
1988	1.14	0.89	1.08
1989	1.02	0.82	0.97
1990	0.99	0.73	0.94

[a]The effective tax rate is the ratio of property taxes to the market value of farmland, computed using only grain farms.

paid by farmland owners. The result was a substantial reduction in the effective tax rate.

In 1983, the tax burden on Illinois farm property began to increase. The effective tax rate increased from 0.56 in 1982 to 1.20 in 1987, an increase of 114 percent. This increase was driven by significant decreases in farmland market values that were not accompanied by comparable changes in property tax payments. In fact, during the 1983 to 1987 period, average per-acre property tax payments were declining, while the tax burden, measured by the effective tax rate, was increasing. This has been referred to as the **farm property tax paradox**– declining property tax payments and increasing property tax burden. An increase of 114 percent in the property tax burden is very significant.

Beginning in 1987, new directions have been taken by both average per-acre property tax payments and the effective farm property tax rate. The shift in direction is best illustrated in Figure 4. The dotted line, representing the effective tax rate as an index, peaked in 1987 and has declined steadily through 1990. This represents a reduction in the property tax burden of 21 percent between 1987 and 1990. The 1990 effective tax rate of 0.94 is comparable to the 1985 effective rate of 0.95 and the 1976 effective rate of 0.96. The tax burden on Illinois farms in 1990 was similar to the burden experienced in 1976, but with significant variation during the 15-year period.

The solid line in Figure 4 is an index of average per-acre property tax payments by Illinois grain farm operators. This line shows the steady increase in per-acre tax payments from 1976 through 1983, a decline from 1983 to 1987, an increase between 1987 and 1988, then a steady state for 1988, 1989, and 1990. The patterns that began in 1987 resemble the pattern observed between 1977 and 1982 when the effective tax rate was decreasing and the average per-acre tax payment was increasing.

It is obvious from Figure 4 that understanding the dynamics of the Illinois farm property tax takes significant effort. Speculating about these dynamics as a

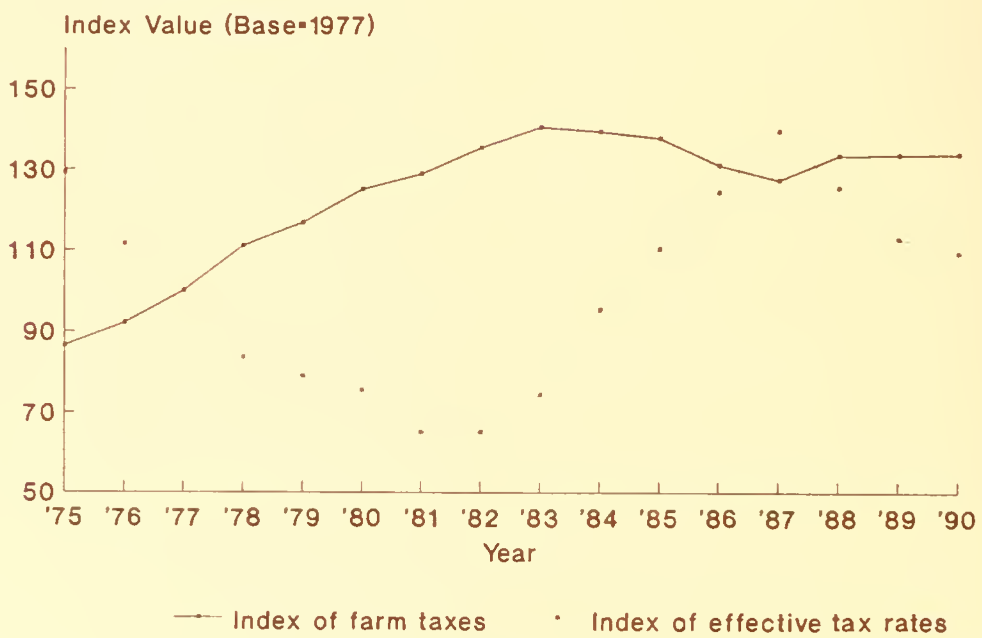

Figure 4. Index of per-acre farm property taxes and effective farm property tax rates, 1975 to 1990.

basis for property tax reform requires even more careful thought. The patterns in Figure 4 illustrate very vividly the important role economic forces play in farm property taxation. Changes in the market value of farmland are the major determinant of the "burden" of the farm property tax at any point in time, as measured by the effective tax rate. The market value of farmland is more dynamic than the numerator of the effective tax rate, the average property tax payment per acre. Economic factors, however, impact the average property tax payment per acre, but more slowly, because these forces must be reflected in the assessment of farmland, which lags behind current economic events.

While this all seems rather abstract, it is very important for members of the General Assembly and the leaders in the governor's office to comprehend the complexity and economic reality of the farm property tax issue in Illinois. Without this comprehension and an appreciation for underlying economic realities, policy reforms may miss their mark by a substantial margin, causing more confusion and misunderstanding.

Summary

Average per-acre property tax payments on Illinois grain farms were stable again in 1990. In nominal dollars, average per-acre payments in 1990 are close to the level paid in 1981 and 1982. Because farmland assessments in 1989 were lower than 1988 assessments, the "steady-state" average per-acre payments in 1989 and 1990 indicate increases in property tax rates that offset the lower assessments. Indications are that farm property tax rates in southern Illinois did not increase enough to offset lower assessments, resulting in lower average per-acre property tax payments in 1990 in that region.

The comparison of the effective tax rate and the average per-acre tax payment indicates a lower "tax burden" and constant nominal tax payments. This is the result of strengthened market values on farmland and the lagged impact of the strengthened agricultural economy on farmland assessments. It will take two years for the stronger farmland assessments reported for 1992 to be reflected in average per-acre tax payments. This should be observed in average per-acre tax payments in 1993.

The complexities and dynamics of the farm property tax system must be understood and appreciated by farm organizations, taxpayer groups, rural school officials, and, importantly, members of the Illinois General Assembly and the governor of Illinois. With a good understanding of these issues, they will be well-equipped to assess current tax policies and practices and to design and implement changes. Although the challenge looms large, the benefits available from a more balanced and responsive public finance system for Illinois are well worth the undertaking.

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Issue 91-15 **October 1991**

Illinois Farmers Look at Corn Production and Marketing

Illinois farmers have participated in a checkoff program to promote and expand the market for corn since 1983. The program is operated by the Illinois Corn Marketing Board whose members are elected by corn growers in 15 districts across the state. The Corn Marketing Board is responsible for determining the use of corn checkoff dollars for research, domestic marketing and product development, international marketing, promotion, education, and other efforts.

Survey Objectives and Procedures

During the summer of 1991, the Illinois Corn Marketing Board and the Illinois Corn Growers supported a study of current government policies dealing with corn and the corn market development program. The study had the following objectives.

- to assess farmers' preferences for and attitudes toward government policies that deal with corn
- to develop awareness of farmers' attitudes toward the market development work and other services of the Illinois Corn Growers Association and the Illinois Corn Marketing Board
- to find out farmers' preferences for operating market development programs through a checkoff program
- to assess the understanding and level of knowledge about checkoff programs among Illinois corn growers

A sample of farm operators and owners from across the state was selected at random from each of the nine crop-reporting districts. The questionnaire was mailed in June. During July, a sample of those who had not responded were interviewed by telephone. Responses from 414 farm operators and owners were obtained for analysis.

Policies to Improve Corn Prices

Respondents were asked to agree or disagree with a list of suggested ways to improve corn prices. Responses varied.

Voluntary price support program. About half of the respondents agreed that the present voluntary price support and acreage control program should be continued. Only 30 percent disagreed and 20 percent did not respond.

Mandatory acreage control. This method requires that all producers cut their acreage a set percentage. It was not a popular choice. Only about one-fifth of the respondents supported this idea.

Raising loan rates. This method was recommended by only 28 percent.

Research to expand domestic food and feed uses for corn. Eighty-five percent of the respondents supported this idea.

More research and development to expand domestic use for ethanol fuel and industrial purposes. Such efforts were favored by 84 percent.

Joint efforts between the U.S. Department of Agriculture and producer and industry groups to promote corn usage in foreign countries. This idea was advocated by about four out of five respondents.

Setting a minimum purchase price at no less than the cost of production for all corn that farmers sell. This was favored by only about one out of three respondents.

Eliminating all price-support programs. This was not a popular choice. Only about one-fourth of all respondents agreed, about one-half disagreed, and one-fourth did not respond.

Use of Ethanol

One of the major programs of the Illinois Corn Marketing Board and the Illinois Corn Growers Association has been promotion of ethanol fuel. This study shows that Illinois corn growers support the use of ethanol. About one-third always use ethanol-blended gasoline in their cars, about four out of ten used it sometimes, and the remainder do not use it or did not respond.

For their trucks, more than half of the respondents use ethanol always or sometimes. About one-third did not use it, did not own a truck, or did not respond.

For other engines on the farm, only about half used ethanol-blended gasoline always or sometimes, while the remainder never used it, were not sure, or did not respond.

Programs for Funding with Checkoff Money

Respondents were asked to rate programs that could be funded by the Illinois Corn Marketing Board. Some suggested programs were more acceptable than others.

The highest rated programs favored by 80 percent or more were: (1) more research to develop new industrial uses for corn, such as road salt de-icer, degradable plastics, and other uses; (2) programs to increase corn exports; (3) more research to improve efficiency of ethanol production and to expand its use; and (4) more research to expand the market for corn through new food products.

The following programs were strongly supported by 60 to 70 percent of all respondents: (1) more research to decrease costs of producing corn; (2) programs to increase meat consumption in foreign countries to stimulate our meat exports; (3) more research in sustainable agriculture to develop more efficient use of herbicides and fertilizers; (4) more public education to increase corn usage; and (5) programs to improve the public image of farmers and agriculture.

Suggested programs that received the lowest ratings were: (1) doing more research to develop higher-yielding corn varieties; and (2) increasing only domestic uses for corn.

Illinois Corn Marketing Board Ratings

Respondents were asked to rate the Illinois Corn Marketing Board based on their support for the various corn market development and promotion programs. Among all respondents, 44 percent rated the board excellent or good, and 29 percent rated them fair. Only 6 percent gave a poor rating, while 21 percent were not sure or did not respond.

Evaluating Checkoff Programs

About eight out of ten respondents favor the corn checkoff program. About one-third favor a voluntary program, while almost half believe that all producers should be assessed under a mandatory checkoff program because all benefit from expanding markets.

About 11 percent of respondents oppose checkoff programs for various reasons. The main reasons given were that the programs did not really help improve corn prices or expand markets, that board members are not spending money in the right ways, and respondents objected to the method of checking off funds when corn is sold.

How much is a reasonable assessment? The current assessment for Illinois is 1/4 cent per bushel. Among all respondents, 41 percent believed this is a reasonable assessment. However, 45 percent thought 1/2 to 2 cents would be a reasonable checkoff. The remaining 14 percent had other suggestions or did not respond.

What about using a percentage of value for the checkoff? In one state, the program has a checkoff of 1/4 percent of the value of the corn sold. Some suggest this would be fairer because the checkoff would be less per bushel when prices are down and more when prices are higher. About 21 percent would favor 1/10 of a percent; half believed that 1/4 to 1 percent would be a reasonable contribution. The remainder had other suggestions or did not respond.

Program Operation and Refunds

The corn program in Illinois has always been voluntary, and members have always been able to request a refund. However, only 59 percent were aware that they could do this. Only 6 percent of the respondents reported that they had ever requested a refund.

Respondents were asked if they favored a checkoff program in which: (1) each state operated its program independently with a farmer-elected board; or (2) a national program for all states operated under a farmer board appointed by the Secretary of Agriculture. A majority preferred having a state-operated program while 37 percent favored a national program.

Illinois Corn Growers Membership and Activities

Many farm commodity groups have shown substantial growth in membership in recent years. Because the Illinois Corn Growers would like to increase their membership, questions were asked to identify the reasons that a corn grower would be likely to join.

The most frequent reasons given for belonging to the Corn Growers Association were: conducting market development activities to increase the uses for corn, conducting educational programs for the general public on the many uses of corn, and lobbying for public policies favorable to corn growers. Many respondents also believed a newsletter to keep them informed on current corn usage would be a useful service from the organization. An invitation to join was not considered a strong reason for becoming involved with the organization.

Because legislative activities were rated an important part of the organization's program, respondents were asked which types of activities should be initiated. Among all respondents, 85 percent favored programs to increase domestic uses of corn such as ethanol, road salt de-icer, or corn sweetener. Influencing the outcome of trade negotiations was supported by 72 percent. Working for funding for utilization research was supported by 67 percent. Influencing the major farm bills to favor corn producers was favored by 59 percent. Funding for production research was favored by 51 percent.

Corn producer conferences have been held jointly with the Land of Lincoln Soybean Association in some years and separately in some years. Among all respondents, only 4 percent had ever attended a statewide conference sponsored by the Illinois Corn Growers Association.

Respondents were asked if they had any preferences about these conferences. A small percentage preferred a separate conference over a joint conference with another organization or a farm show. However, 38 percent expressed no preference.

The Corn Grower Profile

The majority of respondents planted less than 250 acres of corn in 1991. About one-fourth planted between 250 and 750 acres. More than half sold all the corn they produced, and about one-fourth fed some and sold some. About two out of three were enrolled in the government corn program.

About one-third of the respondents were under 50 years of age, one-third were between 50 and 64, and one-third were 65 or over. The respondents were about equally divided between those who owned all the land they farmed, those who rented all the land they farmed, and those who owned land and rented it to others. Slightly more respondents owned some land and rented some land that they farmed.

About two-thirds were members of Farm Bureau. Between 6 and 13 percent were also members of associations for soybean growers, corn growers, pork producers, beef producers, and the Farm Business Farm Management Association.

Conclusions

Corn growers favor keeping the present voluntary price support and acreage control program but oppose raising loan rates to force market prices higher.

Illinois corn growers strongly favor policies to conduct research and market development programs for corn at home and abroad. They also support efforts to expand uses of corn for food, feed, and industrial purposes.

A substantial majority of corn growers always or sometimes use ethanol in their cars, about half in their trucks, and less than half in other engines on the farm.

Corn growers support the research programs funded by the Illinois Corn Marketing Board to expand uses of corn and increase exports. They also support research to decrease costs of producing corn, developing more efficient use of fertilizers and herbicides, carrying out more public education to increase corn usage, and to improve the public image of farmers and agriculture.

A substantial majority support the corn checkoff program but they are divided about whether the program should be voluntary or mandatory. More prefer to have an individual state program than a national program.

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FARM ECONOMICS
Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

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Variable Cash Rent and Lease Clauses

Cash Rents

We have had another year in Illinois when some parts of the state had serious shortfalls in rainfall. The largest area that seems most affected is in northeastern Illinois from Champaign north. Other smaller areas in the state also had drought. However, some parts of the state—notably from Bloomington southwest and from Charleston south in the southeastern part of the state—were near normal or better. Some farmers in those areas are reporting the best yields they have ever had.

This kind of year always causes a lot of friction when it comes to negotiating the cash rent for the coming year or handling requests by tenants for reduction in cash rent for the current year. Some landowners, often those who have had farming experience themselves, are frequently sympathetic with such cash-rent reduction requests because they know the risks involved. However, there are few landowners who are willing to give a rent reduction in a poor year unless they get an offsetting increase in rent in a good year.

Because of 1983 and 1988, also drought years, we have been recommending that a disaster bonus clause be included in every cash rent lease. The clause we suggest would go into effect only if the yields were outside the normal range. Let's say, for example, that the cash rent agreed on was $100 an acre on a farm that would average 110 bushels of corn per acre over a long-term period and on which the normal range is from 95 to 125 bushels per acre. The disaster bonus clause might read like this: "The normal yield on this farm is 110 bushels of corn, and the normal range is 95 to 125 bushels per acre. If the yield goes below or above this range, the cash rent will be decreased or increased for that year by the number of bushels the yield is below 95 bushels per acre multiplied by one-third the average price for the year, or the number of bushels above 125 bushels per acre multiplied by one-third the average price for the year." If yields fall in the normal range, there would be no adjustment.

Another approach that we have often recommended is the completely variable cash rent. A formula for this might be:

$$(1)\quad \text{agreed rent} \times \frac{\text{current yield}}{\text{average yield}} \times \frac{\text{current price}}{\text{average price}}$$

The agreed rent would be the dollar amount agreed upon as a fair cash rent for the farm at the beginning of the lease period. The yields could be county yields obtained from the Illinois Crop Reporting Service. The prices might also come from the Illinois Crop Reporting Service or a local elevator. Another formula that we have suggested is:

$$(2)\quad \text{bushels agreed on} \times \frac{\text{current yield}}{\text{average yield}} \times \text{average price per bushel for the year}$$

Both formulas require a starting point, either the normal dollar rent per acre or the bushel share that one would expect if the lease was a bushel rent lease. There are some guidelines that can be used to establish a starting point.

The dollar rent per acre could be based on the normal rate of return on farmland multiplied by the value of land. Five percent would be a good average return on farmland. Discover what land like yours is selling for in the area. (Review the green sheets that record real estate sales. There is a green sheet on file for each sale in each county office of the Supervisor of Assessments.) Then multiply the rate by the land value and add the real estate taxes. For example, if the rate is 5 percent and the value is $2,000 per acre, then value multiplied by rate gives $100 per acre. Then, add on a figure for real estate taxes and miscellaneous costs such as liability insurance—say $25. This would indicate a cash rent of $125 per acre.

To establish a starting point for a bushel rent, there are several sources of information that might be used. The Agricultural Stabilization and Conservation Service (ASCS) of the USDA has an office in each county that has designated corn yields for each farm. You might use the actual average yield on the farm if you have the figures. Or you could use the expected yields based on soil types on the farm. There are modern soil-type maps for almost every county in Illinois that would show the soil types on your farm. Then look up the soil types on the farm in Illinois Cooperative Extension Service Circular 1156 to find the expected yields. This circular gives a basic and a high-management level of yield for each soil type. The midpoint of these two yields is probably the best figure to use. One-third of these indicated yields makes a good starting point.

A very few top-quality, well-drained, highly fertile farms in strong demand areas might command as much as 40 percent, particularly when the farm has some improvements such as grain bins. Other lesser quality farmsfarms with irregular fields, weed problems, ditches, or poor drainage—might command only 25 to 30 percent of the expected yield as a basis for the starting point on bushel rent. The percentage of the yield that should be calculated as the bushel rent is higher on farms with high normal yields and lower on farms with low normal yields because the farmer has certain fixed expenses to meet whether the farm is a good farm or a poor farm. On a poor farm, therefore, the farmer needs a larger proportion of the yields to cover these costs. Table 1 gives proposed "standing rents" by crop level yields for major Illinois crops. Standing rent is bushel rent, or the share of a crop that is paid to rent the farm when the farmer pays for all farming costs except the real estate taxes. This "standing rent" guide is a good way to determine the number of bushels that could be used as the starting point in cash-rent lease formula number 2.

Legal Aspects of the Lease

Certain legal aspects should be covered in every lease: (1) the name of the lessor; (2) the name of the lessee; (3) a description of the real estate being leased; (4) the amount of the rent; and (5) the termination date for the lease. The British had a long lease (99 years) on Hong Kong, but even that will soon terminate. So a termination date is needed. We recommend that all persons renting farmland have a written lease so that no misunderstanding will occur. And, if either the tenant or landowner should die, heirs will know the terms of the lease and they can complete the lease year without argument about lease terms.

If you have a verbal lease, the notice to terminate must be given at least four months before the end of the lease. This generally means prior to November 1.

Quasi-Legal Aspects of the Lease

Regulations coming from the EPA and the super-fund legislation make the landowner liable for environmental hazards. Due diligence is important in reducing or minimizing these hazards. Part of due diligence on the part of the landowner is appropriate warning, supervision, and control of the tenant with regard to these hazards. The federal 1990 farm bill also includes regulations regarding accounting of hazardous chemicals. Because of these regulations, we recommend that the following clauses be included in farm leases:

1. At least annually, the tenant shall report to the landowner the kind and amount of any and all chemicals and fertilizer applied to the farm by field and location.

2. When using chemicals for weed or insect control or for any other use, they should be applied at levels not exceeding the

Table 1. Proposed Standing Rents by Crop Yield Levels for Major Illinois Crops

Corn		Soybeans		Wheat		Hay and pasture	
Avg. yield	Standing rent	Avg. yield (bu.)	Standing rent (bu.)	Avg. yield (bu.)	Standing rent (bu.)	Avg. corn yield (bu.)	Standing rent in bu. of corn
150	60	56	26	60	25	150	40
145	56	54	25	58	24	145	38
140	53	52	23	56	22	140	35
135	49	50	22	53	21	135	33
130	46	48	20	52	20	130	31
125	43	46	19	50	18	125	29
120	40	44	18	48	17	120	27
115	37	42	16	46	16	115	25
110	34	40	15	44	15	110	23
105	31	38	14	42	14	105	21
100	29	36	13	40	12	100	19
95	26	34	11	38	11	95	17
90	24	32	10	36	10	90	15
85	22	30	9	34	9	85	13
80	20	28	8	32	9	80	11
75	18	26	7	30	8	75	9
70	16	24	7	28	7	70	8
65	14	22	6	26	6	65	7
60	13	20	5	24	5	60	6
55	11	18	4	22	5	55	5
50	10	16	4	20	4	50	4
45	9	14	3	18	3	45	3
40	8	12	2	16	2	40	2

NOTE: These figures have been developed for a variety of Illinois conditions and locations. This table has not been recently updated for risk or relative change in costs between landowners and tenants. It should serve only as a guide and should be used with some caution.

manufacturer's recommendation for the soil types involved.

3. No chemicals will be stored on the property (farm) for more than one year. When chemicals or petroleum products are stored on the farm, they will be in closed, tight, clearly marked containers stored above ground.

4. No chemicals or chemical containers will be disposed of on the property. Any excess chemicals, chemical containers, other hazardous wastes now stored, or any such items disposed of on the property will be removed.

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Illinois Farmers Look at Corn Production and Marketing

Illinois farmers have participated in a checkoff program to promote and expand the market for corn since 1983. The program is operated by the Illinois Corn Marketing Board whose members are elected by corn growers in 15 districts across the state. The Corn Marketing Board is responsible for determining the use of corn checkoff dollars for research, domestic marketing and product development, international marketing, promotion, education, and other efforts.

Survey Objectives and Procedures

During the summer of 1991, the Illinois Corn Marketing Board and the Illinois Corn Growers supported a study of current government policies dealing with corn and the corn market development program. The study had the following objectives.

- to assess farmers' preferences for and attitudes toward government policies that deal with corn
- to develop awareness of farmers' attitudes toward the market development work and other services of the Illinois Corn Growers Association and the Illinois Corn Marketing Board
- to find out farmers' preferences for operating market development programs through a checkoff program
- to assess the understanding and level of knowledge about checkoff programs among Illinois corn growers

A sample of farm operators and owners from across the state was selected at random from each of the nine crop-reporting districts. The questionnaire was mailed in June. During July, a sample of those who had not responded were interviewed by telephone. Responses from 414 farm operators and owners were obtained for analysis.

Policies to Improve Corn Prices

Respondents were asked to agree or disagree with a list of suggested ways to improve corn prices. Responses varied.

Voluntary price support program. About half of the respondents agreed that the present voluntary price support and acreage control program should be continued. Only 30 percent disagreed and 20 percent did not respond.

Mandatory acreage control. This method requires that all producers cut their acreage a set percentage. It was not a popular choice. Only about one-fifth of the respondents supported this idea.

Raising loan rates. This method was recommended by only 28 percent.

Research to expand domestic food and feed uses for corn. Eighty-five percent of the respondents supported this idea.

More research and development to expand domestic use for ethanol fuel and industrial purposes. Such efforts were favored by 84 percent.

Joint efforts between the U.S. Department of Agriculture and producer and industry groups to promote corn usage in foreign countries. This idea was advocated by about four out of five respondents.

Setting a minimum purchase price at no less than the cost of production for all corn that farmers sell. This was favored by only about one out of three respondents.

Eliminating all price-support programs. This was not a popular choice. Only about one-fourth of all respondents agreed, about one-half disagreed, and one-fourth did not respond.

Use of Ethanol

One of the major programs of the Illinois Corn Marketing Board and the Illinois Corn Growers Association has been promotion of ethanol fuel. This study shows that Illinois corn growers support the use of ethanol. About one-third always use ethanol-blended gasoline in their cars, about four out of ten used it sometimes, and the remainder do not use it or did not respond.

For their trucks, more than half of the respondents use ethanol always or sometimes. About one-third did not use it, did not own a truck, or did not respond.

For other engines on the farm, only about half used ethanol-blended gasoline always or sometimes, while the remainder never used it, were not sure, or did not respond.

Programs for Funding with Checkoff Money

Respondents were asked to rate programs that could be funded by the Illinois Corn Marketing Board. Some suggested programs were more acceptable than others.

The highest rated programs favored by 80 percent or more were: (1) more research to develop new industrial uses for corn, such as road salt de-icer, degradable plastics, and other uses; (2) programs to increase corn exports; (3) more research to improve efficiency of ethanol production and to expand its use; and (4) more research to expand the market for corn through new food products.

The following programs were strongly supported by 60 to 70 percent of all respondents: (1) more research to decrease costs of producing corn; (2) programs to increase meat consumption in foreign countries to stimulate our meat exports; (3) more research in sustainable agriculture to develop more efficient use of herbicides and fertilizers; (4) more public education to increase corn usage; and (5) programs to improve the public image of farmers and agriculture.

Suggested programs that received the lowest ratings were: (1) doing more research to develop higher-yielding corn varieties; and (2) increasing only domestic uses for corn.

Illinois Corn Marketing Board Ratings

Respondents were asked to rate the Illinois Corn Marketing Board based on their support for the various corn market development and promotion programs. Among all respondents, 44 percent rated the board excellent or good, and 29 percent rated them fair. Only 6 percent gave a poor rating, while 21 percent were not sure or did not respond.

Evaluating Checkoff Programs

About eight out of ten respondents favor the corn checkoff program. About one-third favor a voluntary program, while almost half believe that all producers should be assessed under a mandatory checkoff program because all benefit from expanding markets.

About 11 percent of respondents oppose checkoff programs for various reasons. The main reasons given were that the programs did not really help improve corn prices or expand markets, that board members are not spending money in the right ways, and respondents objected to the method of checking off funds when corn is sold.

How much is a reasonable assessment? The current assessment for Illinois is 1/4 cent per bushel. Among all respondents, 41 percent believed this is a reasonable assessment. However, 45 percent thought 1/2 to 2 cents would be a reasonable checkoff. The remaining 14 percent had other suggestions or did not respond.

What about using a percentage of value for the checkoff? In one state, the program has a checkoff of 1/4 percent of the value of the corn sold. Some suggest this would be fairer because the checkoff would be less per bushel when prices are down and more when prices are higher. About 21 percent would favor 1/10 of a percent; half believed that 1/4 to 1 percent would be a reasonable contribution. The remainder had other suggestions or did not respond.

Program Operation and Refunds

The corn program in Illinois has always been voluntary, and members have always been able to request a refund. However, only 59 percent were aware that they could do this. Only 6 percent of the respondents reported that they had ever requested a refund.

Respondents were asked if they favored a checkoff program in which: (1) each state operated its program independently with a farmer-elected board; or (2) a national program for all states operated under a farmer board appointed by the Secretary of Agriculture. A majority preferred having a state-operated program while 37 percent favored a national program.

Illinois Corn Growers Membership and Activities

Many farm commodity groups have shown substantial growth in membership in recent years. Because the Illinois Corn Growers would like to increase their membership, questions were asked to identify the reasons that a corn grower would be likely to join.

The most frequent reasons given for belonging to the Corn Growers Association were: conducting market development activities to increase the uses for corn, conducting educational programs for the general public on the many uses of corn, and lobbying for public policies favorable to corn growers. Many respondents also believed a newsletter to keep them informed on current corn usage would be a useful service from the organization. An invitation to join was not considered a strong reason for becoming involved with the organization.

Because legislative activities were rated an important part of the organization's program, respondents were asked which types of activities should be initiated.

Among all respondents, 85 percent favored programs to increase domestic uses of corn such as ethanol, road salt de-icer, or corn sweetener. Influencing the outcome of trade negotiations was supported by 72 percent. Working for funding for utilization research was supported by 67 percent. Influencing the major farm bills to favor corn producers was favored by 59 percent. Funding for production research was favored by 51 percent.

Corn producer conferences have been held jointly with the Land of Lincoln Soybean Association in some years and separately in some years. Among all respondents, only 4 percent had ever attended a statewide conference sponsored by the Illinois Corn Growers Association.

Respondents were asked if they had any preferences about these conferences. A small percentage preferred a separate conference over a joint conference with another organization or a farm show. However, 38 percent expressed no preference.

The Corn Grower Profile

The majority of respondents planted less than 250 acres of corn in 1991. About one-fourth planted between 250 and 750 acres. More than half sold all the corn they produced, and about one-fourth fed some and sold some. About two out of three were enrolled in the government corn program.

About one-third of the respondents were under 50 years of age, one-third were between 50 and 64, and one-third were 65 or over. The respondents were about equally divided between those who owned all the land they farmed, those who rented all the land they farmed, and those who owned land and rented it to others. Slightly more respondents owned some land and rented some land that they farmed.

About two-thirds were members of Farm Bureau. Between 6 and 13 percent were also members of associations for soybean growers, corn growers, pork producers, beef producers, and the Farm Business Farm Management Association.

Conclusions

Corn growers favor keeping the present voluntary price support and acreage control program but oppose raising loan rates to force market prices higher.

Illinois corn growers strongly favor policies to conduct research and market development programs for corn at home and abroad. They also support efforts to expand uses of corn for food, feed, and industrial purposes.

A substantial majority of corn growers always or sometimes use ethanol in their cars, about half in their trucks, and less than half in other engines on the farm.

Corn growers support the research programs funded by the Illinois Corn Marketing Board to expand uses of corn and increase exports. They also support research to decrease costs of producing corn, developing more efficient use of fertilizers and herbicides, carrying out more public education to increase corn usage, and to improve the public image of farmers and agriculture.

A substantial majority support the corn checkoff program but they are divided about whether the program should be voluntary or mandatory. More prefer to have an individual state program than a national program.

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Break-Even Prices for Cattle Feeding in 1991-1992

Cattle feeders should calculate the break-even prices of fed cattle before purchasing replacements. This year, break-even sale prices were determined by computer and covered estimated variable or variable and fixed costs for steer calves, yearling steers, heifer calves, and yearling heifers. The calculations are based on the data listed in Table 1. Tables 2–13 give various corn and cattle purchase prices.

The purchase and sale weights of cattle are considered to be on a pay-weight-to-pay-weight basis. The cattle weights and daily gains are consistent with those reported from northern Illinois feedlots in recent years.

Total feed requirements per head are shown in Table 1. The price of corn silage per ton was computed at 6.7 times the price of Number 2 corn plus variable costs of $6.00 per ton for harvesting and storing the silage. This calculation: (1) assumes a ratio of 6.7 bushels of corn per ton to 35 percent dry-matter silage; (2) ensures receiving the least market value for the grain; and (3) covers the cost of harvesting and hauling the silage. Silage prices do not include storage costs or storage losses because these will vary from farm to farm. Hay was priced at $70 per ton and supplement at $13.65 per hundredweight for a 40 percent protein supplement containing Rumensin. Rations for heifers include a 40 percent protein supplement and MGA at $14.80 per hundredweight.

Table 1. Data Used to Compute Break-Even Prices for Cattle (Feeder Pig Data Included)

	Steer calves	Yearling steers	Yearling steers	Heifer calves	Yearling heifers	Yearling heifers	Feeder pigs
Purchase weight (pounds)	475	700	800	450	600	700	50
Sale weight (pounds)	1,075	1,100	1,200	950	950	1,050	225
Daily gain (pounds)	2.2	2.7	3.3	2.0	2.5	2.9	1.5
Number of days fed	270	150	120	250	140	120	120
Death loss (percent)	2	1	1	2	1	1	3
Feed per head:							
Corn (bushels)	50	40	39	45	36	38	10.2
Corn silage (tons)	2.25	1.1	1.1	1.75	1	1	
Hay (pounds)	300	250	250	250	250	250	
Supplement (pounds)	360	225	120	300	200	120	130
Interest rate (percent)	11	11	11	11	11	11	11
Variable costs per head:							
Labor	$ 7	$ 4	$ 4	$ 6	$ 4	$ 4	$2.00
Veterinary	9	6	6	8	9	9	.75
Power and utilities	16	9	9	14	8	8	2.75
Purchase costs	10	14	14	9	12	12	1.00
Selling costs	11	12	12	10	10	10	2.25
Total variable costs	$ 53	$ 45	$ 45	$ 47	$ 43	$ 43	$8.75
Fixed costs per head:							
Labor	$ 13	$ 7	$ 6	$ 12	$ 7	$ 6	$ 8
Buildings and equipment	45	24	24	40	22	22	4
Overhead	5	3	3	4	3	3	1
Total fixed costs	$ 63	$ 34	$ 33	$ 56	$ 32	$ 31	$ 13

Table 2. Steer Calves, 475 to 1,075 Pounds, Variable Costs Only

Purchase price of calves ($/cwt)	Price of corn per bushel: $1.75	$2.00	$2.25	$2.50	$2.75
	Break-even sales price needed to cover variable cost per cwt ($/cwt)				
70	57.15	58.67	60.19	61.70	63.21
75	59.59	61.11	62.62	64.14	65.65
80	62.02	63.54	65.06	66.58	68.10
85	64.45	65.97	67.50	69.02	70.54
90	66.88	68.40	69.94	71.46	72.98
95	69.31	70.83	72.35	73.87	75.39
100	71.75	73.26	74.76	76.28	77.80
105	74.18	75.69	77.17	78.69	80.21
110	76.62	78.12	79.58	81.10	82.62
Feed cost/cwt produced*	31.71	34.47	37.23	39.99	42.75

Table 3. Steer Calves, 475 to 1,075 Pounds, Fixed and Variable Costs

Purchase price of calves ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover fixed and variable costs ($/cwt)				
70	63.13	64.65	66.17	67.68	69.21
75	65.57	67.09	68.60	70.12	71.65
80	68.00	69.52	71.04	72.56	74.09
85	70.43	71.95	73.47	75.00	76.53
90	72.86	74.38	75.90	77.42	78.94
95	75.29	76.81	78.33	79.85	81.37
100	77.72	79.24	80.76	82.28	83.80
105	80.15	81.67	83.19	84.71	86.23
110	82.58	84.10	85.62	87.14	88.66
Feed cost/cwt produced*	31.71	34.47	37.23	39.99	42.75

Table 4. Yearling Steers, 700 to 1,100 Pounds, Variable Costs Only

Purchase price of yearling steers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover variable costs only ($/cwt)				
65	60.47	61.56	62.65	63.74	64.83
70	63.83	64.92	66.01	67.10	68.19
75	67.19	68.28	69.37	70.46	71.55
80	70.55	71.64	72.73	73.82	74.91
85	73.91	75.00	76.09	77.18	78.27
90	77.27	78.36	79.45	80.54	81.63
95	80.63	81.72	82.81	83.90	84.99
100	83.99	85.08	86.17	87.26	88.35
Feed cost/cwt produced*	33.22	36.27	39.32	42.36	45.41

Table 5. Yearling Steers, 700 to 1,100 Pounds, Fixed and Variable Costs

Purchase price of yearling steers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover fixed and variable costs ($/cwt)				
65	63.59	64.68	65.77	66.86	67.95
70	66.95	68.04	69.13	70.22	71.31
75	70.32	71.41	72.50	73.59	74.68
80	73.68	74.77	75.86	76.95	78.04
85	77.04	78.13	79.22	80.31	81.40
90	80.40	81.49	82.58	83.67	84.76
95	83.76	84.85	85.94	87.03	88.12
100	87.12	88.21	89.30	90.39	91.48
Feed cost/cwt produced*	33.22	36.27	39.32	42.36	45.41

Table 6. Heifer Calves, 450 to 950 Pounds, Variable Costs Only

Purchase price of heifer calves ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover variable cost per cwt ($/cwt)				
70	59.62	61.14	62.66	64.18	65.70
75	62.22	63.74	65.26	66.78	68.30
80	64.83	66.35	67.87	69.39	70.91
85	67.44	68.96	70.48	72.00	73.52
90	70.05	71.57	73.09	74.61	76.13
95	72.66	74.18	75.70	77.22	78.74
100	75.27	76.79	78.31	79.83	81.35
105	77.88	79.40	80.92	82.44	83.96
110	80.49	82.01	83.53	85.05	86.57
Feed costs/cwt produced*	33.90	36.85	39.80	42.75	45.70

Table 7. Heifer Calves, 450 to 950 Pounds, Fixed and Variable Costs

Purchase price of heifer calves ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover fixed and variable costs per cwt ($/cwt)				
70	65.64	67.15	68.67	68.68	70.20
75	68.24	69.76	71.28	72.80	74.32
80	70.84	72.36	73.88	75.40	76.92
85	73.44	74.96	76.48	78.00	79.52
90	76.04	77.56	79.08	80.60	82.12
95	78.64	80.16	81.68	83.20	84.72
100	81.24	82.76	84.28	85.80	87.32
105	83.84	85.36	86.88	88.40	89.92
110	86.44	87.96	89.48	91.00	92.52
Feed cost/cwt produced*	33.90	36.85	39.80	42.75	45.70

Table 8. Yearling Heifers, 600 to 950 Pounds, Variable Costs Only

Purchase price of yearling heifers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even prices needed to cover variable costs only ($/cwt)				
65	61.32	62.46	63.61	64.75	65.89
70	64.61	65.75	66.93	68.07	69.21
75	67.98	69.12	70.26	71.40	72.54
80	71.31	72.45	73.59	74.73	75.87
85	74.64	75.78	76.92	78.06	79.20
90	77.97	79.11	80.25	81.39	82.53
95	81.30	82.44	83.58	84.72	85.86
100	84.63	85.77	86.91	88.05	89.19
Feed cost/cwt produced*	35.23	38.38	41.54	44.69	47.84

Table 9. Yearling Heifers, 600 to 950 Pounds, Fixed and Variable Costs

Purchase price of yearling heifers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even prices needed to cover fixed and variable costs ($/cwt)				
65	64.73	65.87	67.01	68.15	69.29
70	68.05	69.19	70.34	71.48	72.62
75	71.38	72.52	73.66	74.80	75.94
80	74.71	75.85	76.99	78.13	79.27
85	78.04	79.18	80.32	81.46	82.60
90	81.37	82.51	83.65	84.79	85.93
95	84.70	85.84	86.98	88.12	89.26
100	88.03	89.17	90.31	91.45	92.59
Feed cost/cwt produced*	35.23	38.38	41.54	44.69	47.84

Table 10. Yearling Heifers, 700 to 1,050 Pounds

Purchase price of yearling heifers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even prices needed to cover variable costs only ($/cwt)				
60	55.78	56.84	57.91	58.97	60.04
65	59.27	60.33	61.40	62.46	63.53
70	62.76	63.82	64.89	65.95	67.02
75	66.25	67.31	68.38	69.44	70.51
80	69.74	70.80	71.87	72.93	74.00
85	73.23	74.29	75.36	76.42	77.49
90	76.72	77.78	78.85	79.91	80.98
95	80.21	81.27	82.34	83.40	84.47
Feed cost/cwt produced*	31.28	34.47	37.67	40.86	44.05

Table 11. Yearling Heifers, 700 to 1,050 Pounds

Purchase price of yearling heifers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even prices needed to cover fixed and variable costs ($/cwt)				
60	58.16	59.22	60.29	61.35	62.42
65	61.65	62.71	63.78	64.84	65.91
70	65.14	66.20	67.27	68.33	69.40
75	68.63	69.69	70.76	71.82	72.89
80	72.12	73.18	74.25	75.31	76.38
85	75.61	76.67	77.74	78.80	79.87
90	79.10	80.16	81.23	82.29	83.36
95	82.59	83.65	84.72	85.78	86.85
Feed cost/cwt produced*	31.28	34.47	37.67	40.86	44.05

Table 12. Yearling Steers, 800 to 1,200 Pounds, Variable Costs Only

Purchase price of yearling steers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover variable costs only ($/cwt)				
60	54.33	55.30	56.27	57.23	58.20
65	57.82	58.79	59.76	60.72	61.69
70	61.31	62.28	63.25	64.21	65.18
75	64.80	65.77	66.74	67.70	68.67
80	68.29	69.26	70.23	71.19	72.16
85	71.78	72.75	73.72	74.68	75.65
90	75.27	76.24	77.21	78.17	79.14
95	78.76	79.73	80.70	81.66	82.63
Feed cost/cwt produced*	28.25	31.15	34.05	36.94	39.84

Table 13. Yearling Steers, 800 to 1,200 Pounds, Variable and Fixed Costs

Purchase price of yearling steers ($/cwt)	Price of corn per bushel				
	$1.75	$2.00	$2.25	$2.50	$2.75
	Break-even price needed to cover fixed and variable costs ($/cwt)				
60	56.58	57.55	58.52	59.48	60.45
65	60.07	61.04	62.01	62.97	63.94
70	63.56	64.53	65.50	66.46	67.43
75	67.05	68.02	68.99	69.95	70.92
80	70.54	71.51	72.48	73.44	74.41
85	74.03	75.00	75.97	76.93	77.90
90	77.52	78.49	79.46	80.42	81.39
95	81.01	81.98	82.95	83.91	84.88
Feed cost/cwt produced*	28.25	31.15	34.05	36.94	39.84

*The hundredweight produced includes a deduction in weight for death loss.

Worksheet: My Estimate

Kind of livestock to feed: Cattle ____________ Pigs ____________

Number to buy: ________ Date to buy: ________ Days on feed: ________

1. Determine cost of producing finished animal:

a. Cost of feeder: ______ weight X $______ price = $________

Transportation cost to farm: $________

Total feeder cost $________

b. Feed cost per head: amount X price = cost

Corn, bushels	________	X	$________	=	$________
Small grain, bushels	________	X	$________	=	$________
Supplement, pounds	________	X	$________	=	$________
All hay, tons	________	X	$________	=	$________
Silage, tons	________	X	$________	=	$________
Pasture, days	________	X	$________	=	$________
			Total feed cost		$________

c. Other costs:

1.5% for feeder pigs
2.0% for calves

Death loss: $_____ feeder cost X (or 1.0% for yearlings)$_______

Interest: $______ feeder cost X ______% of interest rate
for ________ year $_______

	Average per head			
	Hogs	Long-fed calves	Short-fed yearlings	
Veterinary, medical, and other	.75	9.00	6.00	$_______
Building, equipment, and power	4.00	61.00	33.00	$_______
Labor	6.75	20.00	11.00	$_______
Overhead	1.00	5.00	3.00	$_______
Selling and buying costs	3.25	21.00	26.00	$_______
	15.75	116.00	79.00	$_______
Total, other nonfeed costs:				$_______

Total: Feeder, Feed, and Other Costs per Head $_______

2. Determine break-even net selling price[a] needed to cover costs:

Divide: $\frac{\text{total cost per head}}{\text{sale weight}^{b}}$ = $_______ X 100 = $_______

Sales price per cwt: $_______

[a]Market price for livestock less trucking, commission, and yardage.
[b]Shrinkage is assumed to be 4 percent from feedlot market weight.

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Issue 91-18 *December 1991*

Economic Multipliers for Rural Illinois Counties and Notes on How to Use Them

When the state's budget is lean, as it is this year in Illinois, economic developers try hard to impress legislators that a project is worthy of government assistance by touting the project's generous "multiplier effects." When the budget is fat, economic developers try hard to impress legislators that a project is worthy by touting generous multiplier effects. Welcome to the economic multiplier game, which refers to the secondary (that is, indirect) job and income gains generated from economic development or other projects. This issue of *Farm Economics Facts and Opinions* explains the "multiplier" and presents bench-mark multipliers for rural Illinois counties. Two examples then illustrate how these multipliers are used to evaluate local and state policies and projects in rural Illinois.

The multiplier refers to the indirect and induced effects of an economic impact. Suppose a new meat-packing plant locates in a rural county, creating 100 new jobs and generating $50 million of net new income in the county. These are the direct impacts of the plant. But there are also indirect and induced effects. The plant requires livestock, machinery, trucks, fuel, financial services, and other inputs from industries in the county and elsewhere. These requirements generate so-called indirect, interindustry job and income effects in the county. In addition to these, the employees of the plant earn income from their effort and spend this income on groceries, housing, entertainment, and other consumer activities. The recipients of this income, in turn, buy groceries and other consumer goods. Such spending generates jobs and income in consumer industries and represents so-called induced effects in the county. If the county employment multiplier in nondurable manufacturing (such as meat packing) equals 2, this means that each new job in meat packing generates one *additional* job somewhere else in the county's economy from the indirect and induced effects.

It is no wonder that economic developers or other supporters of some policy or project love generous multiplers. A developer who uses a multiplier of 8 can boast that for every job in his project, he creates seven more jobs elsewhere in the economy. Moreover, each job generates additional state and local sales and income-tax revenue, which might be used as an argument to justify public support for a project.

There are many ways to calculate multipliers. Because multipliers are often used in policy evaluation, it is useful to have bench marks. The following tables present bench-mark multipliers for rural Illinois counties. They are calculated using IMPLAN (IMpact PLANning), a 528-sector input-output model and data base developed by the Forest Service of the United States Department of Agriculture. Although no model is perfect, IMPLAN is superior to many other methods for calculating multipliers due to the detail in its data. Tables 1-3 present multipliers for 11 industries, which correspond to one-digit Standard Industrial Classification (SIC) industries. There are six rural counties: two from northern Illinois, two from central

Illinois, and two from southern Illinois. Northern Illinois is defined as current Illinois Cooperative Extension Service (CES) regions 1, 2, and 3. Central Illinois is defined as CES regions 4 and 5. Southern Illinois is defined as CES regions 6 and 7. For each third of the state, we chose the two rural counties with the highest and lowest proportions of total employment in farming and agricultural services, whereas rural counties are defined as nonmetropolitan counties by the U.S. Census Bureau. Consequently, the tables allow comparison of multipliers in the most farm-intensive and the least farm-intensive rural counties for each region of the state and across regions of the state. Table 1 presents the employment multipliers, Table 2 gives the output multipliers, and Table 3 shows total income multipliers. Multipliers for the entire state are also given in each table.

Several points are worth noting about these tables:

1. In general, the multipliers are small and, in most cases, are less than 2.
2. Farm-sector multipliers are not sensitive to the farm intensity of the county. For example, the farm-sector employment multipliers in Cumberland County and Vermilion County in central Illinois are about the same size, even though Cumberland County is much more farm-intensive than Vermilion County. Similarly, farm-sector multipliers are about the same size throughout Illinois. For example, the farm-sector employment multipliers in Henderson and DeKalb counties in northern Illinois are about the same size as the farm-sector employment multipliers in Calhoun and Williamson counties in southern Illinois.
3. Somewhat surprisingly, the state-level multipliers are not much larger than the county multipliers. For example, the farm-sector employment multiplier for all of Illinois (1.62) is only marginally larger than the county employment multipliers.

These multipliers can be used as benchmarks for any one-digit industry in any rural Illinois county. Given these multipliers, the most important part of an impact study is to accurately describe the direct impact of a proje or policy. But how does one describe an initial impact, and how does one use the multipliers? hypothetical examples illustrate the procedures (Table 4).

Suppose that new grain deals with the Soviet Union and China increase the demand for U.S grain so that farmers in Henderson County ex ence a 10 percent increase in the prices they receive for corn and soybeans. In 1987, the va of corn and soybean out-put in Henderson Cou was $36,477,576 (1990 dollars) so that a 10 pe cent increase in output value implies an outpu impact of $3,647,758. (Employment and income data are from the *1989 Illinois Statistical Abs* and value of production data are from the *Illi Agricultural Statistics Annual Summary—1988* Using county averages for employment-to-outp and total income-to-output for Henderson Cour the 10 percent increase in output implies dire employment and income increases of 80 jobs a $1,650,246, respectively. (In this example, farn sector employment may not increase much, if all, because price increases alone cause the increased value of output.) Enter the multiplie The *total* output effect in Henderson County i found by multiplying the increase in value of output ($3,647,758) by the farm-sector output multiplier for Henderson County (1.26) for a t output effect of $4,596,175. Similarly, total em ment and income effects are found to be 114 j (that is, 80 x 1.42) and $2,227,832 (that is, $1,650,246 x 1.35), respectively.

The next example illustrates the importance o accurately assessing the direct impact of a po or project. Suppose the Illinois legislature pas bill to continue its subsidy to ethanol produce 2 cents per gallon of ethanol. This retains em ment in the state's ethanol industry. However a consequence of this program, Illinois taxpay now have less to spend due to higher taxes, o other state programs now spend less because the continued subsidies for ethanol. As a first order approximation, reductions in these expe tures (and reductions in jobs these expenditur would otherwise have generated somewhere el in the state) roughly offset increased expenditu and jobs in the ethanol industry. Consequentl this example, the net impact of the ethanol p gram would be nil, regardless of the multiplie in the tables (that is, 0 x any multiplier = 0)

Table 1. Employment Multipliers in Rural Illinois Counties

Sector	Northern		Central		Southern		Illinois
	DeKalb (Low)	Henderson (High)	Vermilion (Low)	Cumberland (High)	Williamson (Low)	Calhoun (High)	
Farm and agricultural services	1.47	1.42	1.40	1.49	1.46	1.50	1.62
Mining	1.30	1.26	1.51	2.84	1.54	1.59	1.64
Construction	1.34	1.25	1.30	1.26	1.33	1.29	1.45
Nondurable manufacturing	1.44	1.35	1.60	1.26	1.42	1.39	1.50
Durable manufacturing	1.42	0.00	1.40	1.30	1.44	1.59	1.93
Transportation and public utilities	1.33	1.29	1.37	1.30	1.37	1.53	1.61
Wholesale trade	1.16	1.18	1.18	1.19	1.22	1.20	1.21
Retail trade	1.20	1.22	1.22	1.23	1.26	1.24	1.26
Finance, insurance, and real estate	1.45	1.43	1.46	1.50	1.54	1.37	1.55
Services	1.24	1.21	1.29	1.24	1.30	1.27	1.36
Government	1.16	1.18	1.18	1.19	1.21	1.19	1.19

NOTE: "Low" means the county in that part of Illinois with the lowest proportion of workers in agriculture (employment in farming plus agricultural services divided by total employment). "High" means the county with the highest proportion of workers in agriculture.

Table 2. Output Multipliers in Rural Illinois Counties

Sector	Northern		Central		Southern		Illinois
	DeKalb (Low)	Henderson (High)	Vermilion (Low)	Cumberland (High)	Williamson (Low)	Calhoun (High)	
Farm and agricultural services	1.31	1.26	1.27	1.27	1.31	1.34	1.59
Mining	1.18	1.11	1.19	1.04	1.24	1.09	1.34
Construction	1.23	1.13	1.25	1.13	1.22	1.16	1.45
Nondurable manufacturing	1.25	1.24	1.24	1.33	1.23	1.45	1.44
Durable manufacturing	1.25	0.00	1.27	1.19	1.16	1.33	1.55
Transportation and public utilities	1.20	1.20	1.25	1.18	1.25	1.36	1.46
Wholesale trade	3.10	3.90	3.15	4.04	2.47	3.23	2.54
Retail trade	1.41	1.33	1.44	1.35	1.41	1.44	1.68
Finance, insurance, and real estate	1.67	1.12	1.20	1.13	1.19	1.14	1.31
Services	1.36	1.35	1.40	1.28	1.42	1.29	1.53
Government	1.34	1.50	1.37	1.41	1.40	1.46	1.52

NOTE: "Low" means the county in that part of Illinois with the lowest proportion of workers in agriculture (employment in farming plus agricultural services divided by total employment). "High" means the county with the highest proportion of workers in agriculture.

Table 3. Total Income Multipliers in Rural Illinois Counties

Sector	Northern		Central		Southern		Illinois
	DeKalb (Low)	Henderson (High)	Vermilion (Low)	Cumberland (High)	Williamson (Low)	Calhoun (High)	
Farm and agricultural services	1.42	1.35	1.32	1.34	1.44	1.52	1.66
Mining	1.18	1.12	1.19	1.05	1.27	1.09	1.32
Construction	1.31	1.20	1.33	1.20	1.28	1.20	1.48
Nondurable manufacturing	1.36	1.31	1.45	1.43	1.34	1.56	1.51
Durable manufacturing	1.32	0.00	1.34	1.29	1.28	1.38	1.82
Transportation and public utilities	1.20	1.21	1.23	1.20	1.21	1.46	1.42
Wholesale trade	3.10	3.92	3.10	4.16	2.56	3.10	2.32
Retail trade	1.44	1.38	1.45	1.40	1.45	1.46	1.60
Finance, insurance, and real estate	1.14	1.10	1.17	1.11	1.17	1.12	1.26
Services	1.34	1.31	1.36	1.25	1.40	1.26	1.41
Government	1.20	1.29	1.21	1.25	1.25	1.25	1.26

NOTE: "Low" means the county in that part of Illinois with the lowest proportion of workers in agriculture (employment in farming plus agricultural services divided by total employment). "High" means the county with the highest proportion of workers in agriculture.

Table 4. Hypothetical Impact Analyses for Rural Illinois

Example 1	Direct impact	Multiplier[a]	Total impact[b]
Employment	80	1.42	114
Output	$3,647,758	1.26	$4,596,175
Total income	$1,650,246	1.35	$2,227,832
Example 2	**Direct impact**	**Multiplier[a]**	**Total impact[b]**
Employment	0	1.62	0
Output	$0	1.59	$0
Total income	$0	1.66	$0

[a]For example 1, the multipliers are for Henderson County. For example 2, the multipliers are for the state of Illinois. See Tables 1-3.

[b]The total impact equals the direct impact times the multiplier.

The examples on page 2 serve two purposes:

1. They show how to use the multipliers in Tables 1, 2, and 3 to evaluate the impacts of projects in any sector in any rural county in Illinois. These multipliers are benchmarks, but they are almost identical to multipliers for all other rural counties in the state.
2. The key to any impact study lies in correctly assessing the initial impact of a project or policy. Changes in national or international policies (such as international grain deals) often lead to positive (or negative) total impacts. Changes in state or local policies (such as state subsidies to produce ethanol) often have small net impacts due to offsetting effects elsewhere in the state. Consequently, before using the multipliers presented in Tables 1-3, you must carefully assess the direct effects of a policy change.

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Issue 92-1 *January 1992*

Why Some Farms Earn More than Others

A study of *Illinois Farm Business Records* for 1976 through 1985 shows that one farmer in four in the center of the Cornbelt earned enough more than the lowest incomes of three similar farmers to pay for the average farm in 35 to 40 years from the difference in net farm incomes (NFI) (Table 1). A similar study of 240 northern and central Illinois farms with continuous records for the 1936-1945 period showed that one farmer in five earned enough more than the lowest incomes of four similar farms to pay for the average farm in 15 to 20 years from the differences in NFI. Similar studies in nearly every decade since World War I, including the ones made for 1916-22, 1932-34, and 1944-46, yielded similar conclusions. The analysis of the farm records in all these studies involves the total farm unit, including both operator and landlord shares of the business combined. The net farm income on rented land is shared with the landlord(s) in accordance with the terms of the lease. Why this difference?

Before going into more detail about the latest study of the 1976-85 records, completed in 1987, we can comment on one general observation gleaned from these studies. When a statistical analysis was applied to the last two ten-year studies (1936-45 and 1976-85), it showed that the differences in crop yields between the high fifth or fourth and the low fifth or fourth NFI groups were highly significant. In the 1936-45 study, a statistical analysis attempted to determine how much of the differences in net farm income between the high and low groups were caused by nine different efficiency factors. We found that higher crop yields accounted for 28 percent of the difference. This was 2.4 times the percentage of the next closest factor (livestock feeding efficiency).

In 1958, we studied a large sample of central Illinois grain farms that were similar in size. We found that high gross crop values (crop yield x acres in crop x prices received) accounted for three-fourths of the income differences between the high fourth and the low fourth net income groups. Consider that today about 85 percent of the input value of all the factors of production in land, labor, nonland capital, and management used on typical grain farms is in the form of land. Whatever production values you extract from the land factor will tend to have a high correlation with the net farm income from the sum of the four basic factors of production. Sound agronomic practices, good judgment, and timeliness of operations in crop production are some of the important factors associated with getting high net farm incomes on Illinois grain farms.

Although we know that getting high crop yields on grain farms is associated with superior managerial ability, little is known about the characteristics that separate superior managers from less successful ones. To learn more about these characteristics, Steven T. Sonka and James N. Thorpe investigated the relationships between long-term performance and managerial characteristics for a large sample of Illinois cash grain farms for the period 1976 to 1985.

To compensate for the large number and different types of individual farm units and

Table 1. Selected Measures of Farm Characteristics and Financial Performance for a Sample of Illinois Cash Grain Farms[a]

Characteristic	Average values for: Top group	Bottom group	
*NFI/acre	110	58	$/ac
*NFI/VFP	39	24	%
*Corn yields	133	127	bu/ac
*Soybean yields	44	41	bu/ac
Corn prices received	3.00	2.95	$/bu
Soybean prices received	7.75	7.49	$/bu
Operating expense/acre	127	125	$/ac
*Operating expense/VFP	32	41	%
*Interest expense/acre	9	18	$/ac
*Interest expense/VFP	3	7	%
*Number of tillable acres	495	603	acres
Soil rating	86	86	
Percentage of farm acreage in:			
Corn	50	51	%
Soybeans	44	43	%
Diverted acres	2	3	%

[a]All values are averages over the period 1976 to 1985. Financial values are in terms of real 1982 dollars.
*Statistically significant at the 1 percent level.
Source: Tables 1 and 2 are taken from "Income Performance and Managerial Characteristics on Illinois Cash Grain Farms," by Steven T. Sonka and James N. Thorpe, *Journal of the American* Society of Farm Managers and Rural Appraisers, vol. 55, no. 1, April 1991, pp. 11-15.

year-to-year variability, they selected a primary data source furnished with records kept by farm operators enrolled in the Illinois Farm Business Farm Management (FBFM) Association farm record-keeping and business analysis program. These farmers had continuous, complete, and accurate records for the full ten-year period. The data shown in Table 1 describes the business performance of the 135 farms with usable records over this period. Note that the farms had similar soil quality, land use patterns, and geographic characteristics. Demographic characteristics indicated that these farmers were typical of those with whom the field staff worked in age, education, number of operators per farm, size of farm, and off-farm earnings. A special survey of the professional field staff (who assist cooperating farmers in compiling and analyzing their records) is summarized in Table 2.

For this analysis, financial performance was measured by NFI per tillable acre. No single measure or ratio can capture all dimensions of financial performance; however, NFI does contain useful information. The average value of $110 per tillable acre for the 34 farms in the high (top) fourth group and $58 for the 34 farms in the low (bottom) fourth group are listed in Table 1. Note that the financial values for the selected measures are all listed in terms of real (constant) 1982 dollars. Items marked with an asterisk are statistically most significant.

The farm characteristics and financial performances most important for explaining NFI differences between these two groups are shown in Table 1 as follows: (1) corn and soybean yields, (2) operating expense per $1.00 of value of production (VFP), and (3) interest expense per $1.00 of VFP.

Other differences might be the farm size for the top income group: 495 versus 603 tillable acres. The size of both groups, however, is consistent with that of commercial farms in

Table 2. Field Staff Respondents' Assessments of Managerial Orientation for the High 25 Percent and Low 25 Percent of Farm Operators in the Sample

Orientation to:	Average top group Score[a]	Rank[b]	Average bottom group Score[a]	Rank[b]
Marketing	2.22	4	2.63	4
Financial planning	2.09	2	2.68	5
Maximizing yields	1.81	1	2.54	2
Working hard physically	2.50	9	2.60	3
Completing details	2.28	5	2.68	5
Reducing operating costs	2.34	6	2.51	1
Reducing overhead costs	2.40	7	2.71	7
Searching for new techniques	2.41	8	2.77	9
Practicing disciplined spending	2.09	3	2.71	7
Average score across the nine management activities	2.24		2.64	

[a]Respondents ranked each firm's orientation to a management activity on a scale of 1 to 5, with a 1 signifying the firm paid much more attention than most and a 5 indicating the firm paid much less attention than on most farming operations.
[b]A rank of 1 indicates that the activity received the most attention and a 9 indicates that the activity received the least attention.

this region. Inherent differences in soil productivity, crop mixes, government income support programs in this period, off-farm income, age of operator, tenure, and so forth were all factors that did not seem to explain the differences in net farm income.

Table 2 summarizes the field staff survey that obtained information about the management orientation and capabilities of farm operators. The perceptions of managerial orientation are categorized relative to objective measures of business performance. The table gives the average score and ranking for each managerial activity for the top and the bottom group.

This survey shows that farmers in the top and bottom groups assess managerial orientation as involvement with these activities:

Top group

1. Maximizing yields
2. Financial planning
3. Disciplined spending

Bottom group

1. Reducing operating costs
2. Maximizing yields
3. Working hard physically

Note that the managers in the top group were perceived as devoting the most effort to maximizing yields, financial planning, and practicing disciplined spending. Conversely, operators in the bottom group were perceived as devoting the most effort to reducing operating costs, maximizing yields, and working hard physically. It would have been useful if the study had had more information on the amount of debt load on each farm because this may have been related to efforts to reduce operating and interest costs in the latter part of this period.

These differences suggest that production orientation, while still very important on cash grain farms, is not as much of a factor today as it was some decades ago in distinguishing managers who attain high income levels from those with lower income performance. Note that business management practices (for example, financial planning and disciplined spending) appear to be more prevalent for the higher income group. Evaluating performance as a financial planner or as being disciplined in spending behavior requires keeping and using complete, current, and accurate farm records, such as the records used in the Illinois FBFM program. The FBFM nonprofit, educational service program has been operating in Illinois for 67 years. In 1991, 7,233 farmers were enrolled. Information on how to enroll in this program is available at your county Extension office or your local FBFM Association offices. Comparative analysis and field staff consultations help farmers determine whether the "as-is" situation on their farm is different than the "ought-to-be." Management really begins to function only when this disparity is perceived. Farmers who need and want this kind of help and information along with learning good record-keeping should plan now to select their system for 1992.

It is interesting to note in Table 2 that the three factors receiving the most attention within the bottom group were very visible physically. But sophisticated financial accounting systems are not needed to evaluate crop yields, expenditures on operating expenses, or the amount of physical effort expended. A number of managerial activities in Table 2 have similar rankings with the two groups. For example, marketing was the fourth-ranked activity for operators of both groups. Similar rankings are noted for completing details and reduction of overhead expenses. Items ranked lowest were searching for new techniques for the bottom group and working hard physically for the top group. The lessons learned from thousands of *Illinois Farm Business Record* summaries can be valuable in helping farmers set their priorities so they can achieve the highest net farm income.

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FARM ECONOMICS Facts & Opinions

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Issue 92-2 *January 1992*

Farm Programs for 1992

Farm Program Signup Dates

The USDA has announced that the 1992 farm program signup for feed grains, wheat, rice, and cotton will be February 10 through April 17.

Feed grain acreage reduction. The USDA has announced a 5 percent acreage reduction program (ARP) for the 1992 crops of corn, grain sorghum, and barley and a 0 percent ARP for oats. The 1991 acreage reduction was 7.5 percent except for oats, which did not have any acreage reduction in 1991. Adjustments in the ARP percentage could have been made not later than November 15 if the total supply of feed grains had changed significantly from the earlier estimates. However, the Secretary of Agriculture has stated that the 5 percent reduction will remain as first announced.

1992 Wheat Program. Wheat farmers will have a 5 percent acreage reduction requirement in the 1992 wheat program. That compares to a 15 percent reduction requirement for the 1991 crop. This percentage was chosen to maintain competitiveness in world markets while balancing the risks of excessive supplies or possible shortages.

Target prices and loan rates. The 1992 crop loan rates for wheat, feed grains, soybeans, and minor oilseeds have been announced as follows:

	Target price, per bu	Loan rate, per bu
Wheat	$4.00	$2.21
Corn	2.75	1.72
Grain sorghum	2.61	1.63
Barley	2.36	1.40
Oats	1.45	0.88
Rye	---	1.46
Soybeans	---	5.02
Minor oilseeds	---	0.089 (per lb)

Because of tighter supplies, the loan rate for wheat is up 8 percent, and feed grains are up 6 percent from the 1991 rates. Soybeans and rye do not have target prices.

Minor oilseeds include sunflower seed, safflower, canola, rapeseed, mustard seed, and flaxseed. They do not have target prices.

Disaster Payments

The President has signed an emergency disaster appropriation bill totaling $1.75 billion. Of this amount, $995 million will be available for 1990 or 1991 crops. A producer has the option of applying for assistance for one of these two years.

The remaining $755 million will be made available if the President requests these funds for emergency crop losses in 1990, 1991, or 1992. If this request is made and the funds are available, the producer can request assistance in one of these years but he cannot request it for a year that he has received assistance under the $995 million appropriation mentioned above. Also, $100 million of the $755 million, if appropriated, is set aside for program crops planted in 1991 for harvest in 1992. For Illinois farmers, wheat would qualify under this provision.

During January, ASCS offices will be preparing to receive applications. The signup period will be February 1–March 30. The requirements to qualify are expected to be similar to the 1988 drought emergency payment provisions. Farmers, should apply through their county ASCS offices. Payments for those who qualify should be available by the end of May or early June.

Amendments to the 1990 Food, Agriculture, Conservation, and Trade Act

During the closing days of the 1991 session, Congress passed a "technical corrections" bill. However, it is actually a series of amendments that do more than just clarify the original bill. The programs most applicable in Illinois for 1992 follow.

Conserving use acres. A producer may plant crambe and sesame on 0/92 and 50/92 conservation use acres. Millet is added to the list of industrial and other crops that may be planted if the Secretary of Agriculture permits its use. The clause "will not affect farm income adversely" is deleted as a condition for allowing industrial and other crops on 0/50 or 0/92 conservation use acres.

Double cropping on 0/92 acres is permitted. Following a minor oilseed or another permitted crop, the second crop may be any crop except program crops and fruits and vegetables. If soybeans are planted, the producer must have an established history of planting soybeans during at least 3 of the last 5 years.

Corn and sorghum bases are combined so planting within the permitted acres is at the discretion of the producer.

The cover requirement on reduced acres is changed from planting 50 percent to "planting or maintaining an annual or perennial cover" on 50 percent of the reduced acreage.

Deficiency payments for wheat, barley, and oats. The USDA is required to accelerate wheat, barley, and oats deficiency payments. They must pay producers a projected final payment at the end of the first 5 months of the marketing year based on the average market price during that period, plus 10 cents per bushel for wheat and 7 cents per bushel for barley and oats.

Minor oilseed loan rates. The Secretary of Agriculture has discretion to limit changes in the county loan rate to no more than plus or minus 9 percent of the national loan rate.

Base transfers. The Secretary may provide for a base transfer if a disaster occurs.

Targeted option program. Congress urges the Secretary to offer the TOP program. This program enables a producer to get a higher target price in exchange for reducing crop plantings below the permitted acreage.

Conservation

Farms for the future. The bill clarifies and makes explicit the implementation of the Farms for The Future program, a program to promote national farmland protection that was first authorized in the 1990 Act.

Integrated farm management program. The Act specifies that the acreage goal is 3 to 5 million acres per year rather than total acreage by 1995. The Act also changes reduction in payments to reflect historical underplantings.

Reduction in Conservation Reserve Program payments is clarified where incidental grazing occurs.

No conservation plans for dairy farmers. The requirement that a dairy farmer who is applying for a refund of the budget reconciliation assessment must have a conservation plan on the farm has been dropped.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 92-3 *January 1992*

The Downstate Economy: What Recession?

The Illinois Economy: Upstate and Downstate

The year 1991 was not kind to the Illinois economy. After growing 2.1 percent in inflation-adjusted dollars from 1989 to 1990, real gross state product is expected to decline by 0.3 percent during 1991. ("Real" dollars are dollar figures adjusted for inflation. All values in this article are in constant 1990 dollars.) We will not know the exact figure for several months, but this is the most recent forecast of the Illinois Econometric Model produced by economists at the University of Illinois. However, economists forecast that the recession in Illinois ended in the first quarter of 1991 and that the state economy has grown slowly since then. Retail sales are leading the way up with year-to-year real growth rates expected to reach 7 percent in early 1992.

State aggregates tend to mask developments downstate, however. The eight-county Chicago Consolidated Metropolitan Statistical Area (CMSA) accounts for 67 percent of total employment and 70 percent of total personal income in Illinois. A detailed analysis of retail sales data reveals that downstate Illinois did much better than Cook County and the 7 collar counties during the first months of the recession. Indeed, the data reported here indicate no recession downstate through 1990.

Current Trends in Real Spending

The data used in this study are based on retail sales taxes collected by the Illinois Department of Revenue. These are among the most comprehensive data available to analyze current developments in the economies of towns and counties in Illinois. Data for 1989 and 1990 are the most recent available at the present time, and they portray two very different economies in the state.

Tables 1 and 2 indicate general developments. Inflation-adjusted ("real") retail expenditures for Illinois and its regions are shown in Table 1. Retail spending is a broad gauge of economic activity and represents about 40 percent of total state personal income before taxes. Retail spending fell by 2.2 percent in Illinois during the most recent period (1989-1990). However, this decline was concentrated in the northern third of Illinois. Real spending actually increased in central and southern Illinois. These trends are continuations of those observed for 1988-1989 (see *Farm Economics Facts and Opinions* 91-13), except that current declines in northern Illinois and in the state have become sharper during the current period.

Table 2 gives a more focused picture of the recession's uneven effects in the state. Hardest hit are the seven collar counties surrounding Chicago where real sales fell over 5 percent. Real spending also fell by 2.5 percent in Cook County so that real sales declined by 3.5 percent in the CMSA. (For 1988-1989, the decline was 1.3 percent.) In contrast, real spending rose in downstate metropolitan areas and in rural agricultural and rural diversified economies (see Table 2 for definitions of these categories). Sales

Table 1. Retail Expenditures by Region of the State

Region of state	Number of towns	Total retail expenditures in 1989 (millions of 1990 $)	Total retail expenditures in 1990 (millions of 1990 $)	Percent change, 1989-1990
Illinois	1,286	81,811.7	80,032.9	-2.2
North	553	64,204.9	62,300.8	-3.0
Central	371	10,384.1	10,486.2	1.0
South	362	7,222.6	7,245.9	0.3

Note: Regions of the state are based on Illinois Cooperative Extension Service (CES) regions. "North" is defined as CES regions 1, 2, and 3 and ranges from Jo Daviess and Lake counties (north) to Henderson and Kankakee counties (south). "Central" is defined as CES regions 4 and 5 and ranges from Hancock and Iroquois counties (north) to Pike and Clark counties (south). "South" is defined as CES regions 6 and 7 and ranges from Calhoun and Crawford counties (north) to Alexander and Massac counties (south).

Table 2. Retail Expenditures by County Type or Economic Base

County type or economic base	Number of towns	Total retail expenditures in 1989 (millions of 1990 $)	Total retail expenditures in 1990 (millions of 1990 $)	Percent change, 1989-1990
Cook	128	37,475.6	36,515.7	-2.6
Collar	173	19,419.3	18,407.6	-5.2
Downstate metropolitan	257	14,445.1	14,599.0	1.1
Rural manufacturing	225	5,484.1	5,433.2	-0.9
Rural agricultural	239	1,581.9	1,610.2	1.8
Rural diversified	264	3,405.7	3,467.2	1.8

Note: "Collar counties" include DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will counties. "Downstate metropolitan" counties include all other metropolitan counties in Illinois as defined by the federal government (18 counties). "Rural agricultural" counties include all rural counties in which employment in farming and agricultural services represents 15 percent or more of total county employment in 1986 (29 counties). "Rural manufacturing" counties include all rural counties in which manufacturing employment represents 15 percent or more of total county employment in 1986 (21 counties). "Rural diversified" counties include all other counties, several of which have employment shares of 15 percent or more in both agriculture and manufacturing (26 counties).

declined in rural manufacturing counties but, even here, the decline was less than for the state overall.

Table 3 considers spending by town size. Towns and cities with populations less than 15,000 did better, on average, than cities with populations over 15,000. Tiny towns with populations less than 250 are notable exceptions, where real sales fell 20 percent. The last column in the table shows results for the median town in each category. Spending in typical towns with populations less than 15,000 grew, whereas spending declined in typical towns with populations greater than 15,000.

Table 4 examines seven expenditure categories that account for about 60 percent of total retail expenditures. Of these categories, auto-related sales is the largest, and there was little overall change in this category. However, there were large gains in the small towns, possibly reflecting larger filling-station revenues caused by high petroleum prices in the second half of 1990. Spending on food, general merchandise, apparel, and hardware declined in most places; these declines, with the exception of food, are continuations of patterns from 1988-1989. In most places, spending increased only for household-related items. Compared to the previous period, sales are stronger only for household and furniture and auto-related establishments in the current period.

The data indicate that spending changes for food, restaurants, and auto-related items are fairly stable for most town categories. However, there is much less stability for general merchandise, apparel, and household and furniture items. Towns with between 5,000 and 10,000 inhabitants were hit especially hard in these more volatile categories. One explanation consistent with the data is that somewhat larger towns (10,000-15,000) are taking market share from these smaller towns. The table also indicates extreme volatility in sales of tiny towns. Although sales overall were down dramatically for these towns, there is no clear trend; tiny towns were among the few with real growth in the previous period.

Conclusions

Several conclusions emerge from the analysis of current retail spending patterns in Illinois towns.

First, downstate Illinois has been spared from the recession—so far. Chicago and its collar counties have followed the U.S. economy into recession, although the downturn in the Chicago metropolitan area has been less severe than for the country overall. The recession's uneven effect is due partly to the different economic base downstate compared to Chicago. Real cash receipts from livestock and crops have been rising since 1988 and have helped bolster rural economies. In addition, the economies of rural Illinois are not closely linked to the state's metropolitan economies. Recessions in the cities are not particularly contagious to the rural areas.

Second, the revenue outlook for local governments in Illinois over the next several quarters calls for slow but stable growth. Although growth in gross state product is likely to be negative for all of 1991, the upturn in Illinois could have begun as early as the second quarter of 1991 and is forecasted to grow throughout 1992 and beyond. Relatively stable growth in state product and income should translate into stable real-estate prices and property taxes, sales taxes, and intergovernmental grants from the state. Stability in property tax revenue is particularly important to counties and townships, which receive, on average, about 30 and 65 percent of their revenues from this source. Municipalities have a more diversified revenue base, and towns and cities outside the Chicago metropolitan area receive about 18 percent of their revenues from property taxes. Although local government officials may confront tight fiscal budgets over the coming year, they can probably depend on slow but steady real growth in revenues without raising taxes. Budgetary difficulties may still arise, however, if real expenditure growth exceeds a more slowly growing revenue base.

Table 3. Retail Expenditures by Town Size

Town size	Number of towns	Total retail expenditures in 1989 (millions of 1990 $)	Total retail expenditures in 1990 (millions of 1990 $)	Percent change, 1989-1990	Median percent change, 1989-1990
0-250	119	30.9	24.7	-19.9	-2.9
251-500	217	199.0	200.5	0.7	6.2
501-2,500	511	4,000.2	4,062.3	1.6	3.7
2,501-5,000	123	3,588.7	3,646.1	1.6	0.9
5,001-10,000	106	8,522.7	7,842.5	-8.0	0.9
10,001-15,000	54	6,895.9	7,003.1	1.6	1.2
15,001-20,000	41	6,116.2	6,002.4	-1.9	-1.2
20,001-25,000	23	5,008.4	4,740.1	-5.4	-3.9
25,001-50,000	50	16,353.2	16,046.9	-1.9	-1.4
50,001-100,000	21	12,407.7	12,257.0	-1.2	-1.1
100,001+	4	18,283.5	17,815.9	-2.6	2.0

Note: "Median percent change" refers to the 50th percentile growth rate for each size category. Fifty percent of the towns have growth rates lower than this, and 50 percent have higher growth rates.

Table 4. Retail Expenditures by Town Size and Business Category

Town size	General merchandise 1990	General merchandise % Δ	Food 1990	Food % Δ	Drinking and eating places 1990	Drinking and eating places % Δ	Apparel 1990	Apparel % Δ
0-250	1.2	-13.6	1.0	-38.2	4.5	-37.4	0.01	-6.7
251-500	6.8	-10.6	9.8	4.4	23.7	-6.5	0.2	-8.8
501-2,500	364.5	-9.0	2,155.1	-3.6	319.3	-1.0	121.1	-3.3
2,501-5,000	277.9	-6.5	216.7	-1.2	323.4	2.8	8.7	-5.3
5,001-10,000	119.0	-21.4	327.1	-2.9	696.8	-4.2	374.2	-24.2
10,001-15,000	1,194.0	2.6	313.2	-5.4	604.0	2.3	409.1	3.7
15,001-20,000	690.3	-9.5	289.8	-3.3	520.3	0.4	189.3	-2.7
20,001-25,000	537.3	-3.9	202.5	-5.7	438.2	-2.0	236.9	-2.7
25,001-50,000	2,230.4	-5.9	708.7	-4.3	1,367.5	0.7	799.2	0.8
50,001-100,000	1,664.5	-10.7	455.6	-4.0	1,026.7	-0.3	693.5	-4.4
100,001+	1,994.6	-10.7	70.5	-0.2	2,546.3	-0.2	1,139.9	-2.7
Illinois	10,088.0	-9.1	3,468.9	-3.5	904.5	-0.3	4,061.3	-4.3

Town size	Household and furniture 1990	Household and furniture % Δ	Lumber, building, and hardware 1990	Lumber, building, and hardware % Δ	Automotive and filling stations 1990	Automotive and filling stations % Δ
0-250	0.5	17.2	1.0	-50.9	8.5	21.5
251-500	3.9	18.7	27.6	-21.7	5.5	21.1
501-2,500	143.5	8.3	425.9	1.7	1,090.2	6.7
2,501-5,000	91.9	2.9	337.6	-3.9	1,082.2	7.6
5,001-10,000	308.1	-11.6	676.6	5.1	1,761.8	2.5
10,001-15,000	242.8	8.4	491.0	1.0	1,589.3	3.0
15,001-20,000	232.5	8.2	562.3	-4.6	1,449.7	-1.4
20,001-25,000	157.7	0.9	414.0	-4.1	1,117.9	-1.5
25,001-50,000	763.6	2.7	1,245.5	-6.9	3,784.0	-0.5
50,001-100,000	577.0	6.2	971.8	-1.7	2,903.7	0.5
100,001+	842.4	-0.2	1,180.8	-8.4	2,498.5	-3.5
Illinois	3,374.2	2.0	6,367.1	-3.6	17,438.2	0.5

Note: Dollars are in millions of 1990 dollars. % Δ means "percent change."

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Issue 92-4 *February 1992*

Projected Financial Outcomes for Illinois Cash-Grain Farms in 1992

The economic outlook for Illinois cash-grain farms for 1992 appears mixed. On the positive side, interest rates on borrowed funds are lower than in recent years so indebted farmers will pay less interest. There is also a relatively small amount of carryover stocks of corn, soybean, and wheat. Consequently, grain prices for 1992 may be somewhat higher than in the recent past.

On the negative side, the set-aside requirements for corn and wheat in 1992 are lower than in recent years, allowing for greater production and a potential rebuilding of stocks that could adversely affect future commodity prices. The anticipated demand from Russia may not materialize due to inadequate cash or other resources to pay for imported grains. And the downturn in the U.S. economy has weakened consumer demand and cut job opportunities for many, including some farmers who work off the farm. Farm operators who experienced drought conditions in 1991 will feel the effects of lower cash flows most in 1992.

1992 Projections and Assumptions

This report provides projection estimates of financial performance for four northern and central and four southern Illinois cash-grain farms of various sizes under a given set of commodity prices and production costs. Table 1 illustrates the commodity prices and farm

Table 1. Commodity Prices Used to Project the 1992 Financial Condition of Illinois Cash-Grain Farms

Commodity	Dollars per bushel
Corn	
Target price	$2.75
Cash price	2.40
Deficiency (80% of base acres)	0.35
Soybeans	
Cash price	5.75
Wheat	
Target price	4.00
Cash price	3.25
Deficiency (80% of base acres)	0.75

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program assumptions made for this report. The Illinois Farm Business Farm Management (FBFM) record-keeping system is the source of information for average farm sizes, yields, and costs of production.

Other assumptions include interest rates at 8.9 percent for farm real-estate loans and 9.0 percent for operating and machinery loans. Cash balances over $10,000 are assumed to be invested at a 5.0 percent annual rate of return. Family living expenses are assumed to be $25,000 for a family of four with $2,250 of income placed into a retirement account if income is sufficient.

Production costs for the various farms were set at the 1990 FBFM averages but increased by four percentage points to reflect the increased price of most inputs. Land values are assumed to increase 2 percent during 1992. Although leverage ratios vary widely, the farms modeled in this report are assumed to have a debt-to-asset ratio (D/A) of 20 percent.

Northern and Central Illinois Cash-Grain Farms

Yields for the northern and central Illinois cash-grain farms are assumed to be 140 bushels per acre for corn and 44 bushels per acre for soybeans. The county Agricultural Stabilization and Conservation Service (ASCS) yield was set at 130 bushels per acre for corn. The set-aside requirement to participate in the government program for 1992 has been set at 5 percent. Deficiency payments are based upon only 80 percent of the corn base acreage. The crop mix is 55 percent corn (including idled acres) and 45 percent soybeans. Each of the four farms modeled is assumed to own 256 tillable acres valued at $2,000 per acre. The balance of the acreage is assumed to be rented on a 50-50 basis with the landlord paying half of the fertilizer, chemical, and seed expenses.

Table 2 illustrates the acreage, tenure position, capital expenditures, off-farm income, and an operator labor charge for each of the farms. Capital purchases for machinery reflect the 1990 average for FBFM participants for each size of farm. All four sizes of farms are assumed to finance 50 percent of their capital purchases. Nonfarm income averaged $12,624 for those FBFM cooperators who accounted for all sources and uses of funds during 1990. For the two smaller farms, much of the nonfarm income comes from off-farm employment; for the larger farms, most nonfarm income is from investments. The operator labor charge is calculated by taking $1,425 times the number of operator labor months. Differences in capital expenditures, nonfarm income, and labor charges are intended to reflect differences associated with different sizes of farming operations.

Projected Results for Northern and Central Illinois Farms

Table 3 illustrates the projected financial outcomes for 1992 for northern and central Illinois cash-grain farms. Results are reported using the five major categories of financial performance measures that have been suggested by the Farm Financial Standards Task Force.

Table 2. Economic Factors Associated with Northern and Central Illinois Grain Operations of Various Sizes

Tillable acres	256	542	930	1,501
Acres rented	0	286	674	1,245
Percentage of land owned (tenure)	100	47	28	17
	Annual			
Capital purchases	$ 8,000	$ 15,000	$ 34,000	$ 53,500
Off-farm income	21,000	12,300	11,400	15,200
Operator labor charge	8,550	17,100	22,800	34,200

Table 3. Projected Financial Outcomes for Northern and Central Illinois Cash-Grain Farms in 1992

Performance measure	Size of farm (tillable acres) 256	542	930	1,501
Liquidity				
Current assets/current liabilities				
12/31/91	2.47	3.14	3.94	4.51
12/31/92	2.14	2.85	3.46	3.98
Solvency				
Debt-to-asset ratio (market values)				
12/31/91	0.20	0.20	0.20	0.20
12/31/92	0.18	0.19	0.20	0.21
Net worth (market)				
12/31/91	$526,000	$569,000	$628,000	$719,000
12/31/92	542,786	589,742	658,718	765,591
Net worth (cost)				
12/31/91	$357,000	$380,000	$419,000	$472,000
12/31/92	364,573	389,132	434,896	500,889
Profitability				
Net farm income (accrual)	$18,167	$30,976	$43,232	$59,915
Return on assets (market)	3.77%	4.32%	5.00%	5.24%
Return on equity (market)	2.04%	2.66%	3.46%	3.73%
Financial efficiency				
Operating expenses/value of farm production (VFP)	52.3%	51.7%	52.9%	55.5%
Depreciation/VFP	8.4%	11.5%	14.4%	15.2%
Interest/VFP	16.6%	12.0%	9.4%	7.6%
Repayment capacity				
Capital debt repayment capacity (CDRC)	$11,653	$20,891	$39,990	$68,091
CDRC margin	-3,052	1,966	10,700	27,736

Liquidity of farming operations is often measured as the ratio of current assets (CA) to current liabilities (CL). The ratio measures the degree to which the farm operation is likely to be able to generate cash to pay off current financial obligations. A ratio above 2:1 is usually considered excellent. As shown in Table 3, all four farms started in a strong liquidity position, although this position is expected to deteriorate during 1992. Much of this deterioration is associated with acquiring machinery and equipment with only 50 percent financing. However, the current ratio is likely to remain at a level deemed excellent by most lenders and financial analysts.

Solvency can be measured in a variety of ways, including the debt-to asset ratio or the dollar amount of net worth. The debt-to-asset (D/A) ratio was specified at 0.20 or 20 percent for all four farms. Little change is expected in this ratio for 1992. Another measure of solvency is net worth, measured on either a cost or market value basis. The projection estimates suggest an increase in both measures for all four sizes of farms in 1992. Market-basis net worth is driven primarily by the assumption of a 2 percent increase in land values. The increase in cost-basis net worth is driven by the projection that these farms will make a profit from both farm and nonfarm sources and retain part of that profit in the business. Projected increases in cost-basis net worth are greater the larger the size of the farm.

Projected net farm income, measured on an accrual basis, ranges from a low of $18,167 on the smallest size farm to $59,915 on the largest size farm. However, another way to view income is the ratio measures of return on assets (ROA) and return on equity (ROE). ROA measures the returns to all assets even though those returns get split between the owner of the business and the lender. In contrast, ROE measures the returns to the equity capital invested by the owner. Both ROA and ROE increase as the size of the farm increases. However, ROA exceeds ROE, suggesting that the lender is getting a greater percentage return on debt capital than the owner is getting on equity capital. Ideally, a business should be able to generate a higher ROE than ROA.

Another way of viewing the profitability numbers is to compare the ROE with some other alternative, such as investing off the farm. While returns on investments in certificates of deposit and savings accounts are now at a very low level, those returns still exceed the projected ROE for even the largest size farm.

Financial efficiency measures for the four different size farms all appear to be within the normal range of outcomes for cash-grain farms. The projection results suggest that depreciation expenses as a percent of value of farm production increase as the size of farm increases. Likewise, interest expenses as a percent of value of farm production decrease even though all of the farms started with the same initial D/A ratio.

Repayment capacity measures the capacity of the business to pay off capital debts and to acquire new capital assets. Capital debt repayment capacity (CDRC) margin reflects the amount of margin after the payment of scheduled principal payments on capital debt and the cash purchases of new capital assets. CDRC margin is negative for the smallest sized farm but it increases as the size of the farm increases. The CDRC margin numbers are closely related to the assumed percentage of capital purchases that are financed. The larger the amount financed, the higher the CDRC margin and the lower the current ratio because cash savings would be used to make the purchases.

Southern Illinois Cash-Grain Farms

Farmland in southern Illinois tends to be less productive, less costly, and cropped differently than land in central and northern Illinois. Consequently, a separate set of projection estimates was developed for southern Illinois cash-grain farms. FBFM data were again used to set up four representative farms that differ in terms of size and other characteristics. Table 4 illustrates the acreage, tenure position, off-farm income. capital purchases, and operator labor charges for four different size farms.

Crop yields for the southern Illinois cash-grain farms were assumed to be 120 bushels per acre for corn with an ASCS yield of 110 bushels per acre, 36 bushels per acre for soybeans, and 50 bushels per acre for wheat with a ASCS yield of 45 bushels per acre. Like corn, the wheat program requires a 5 percent acreage set-aside to be eligible for price support programs. The 1992 target price for wheat is $4.00 per bushel, and the projected market price is $3.25 per bushel. Wheat and corn payments are also subject to the 15 percent reduction. The crop mix for the southern Illinois farms is assumed to be 40 percent corn, 40 percent soybeans, and 20 percent wheat.

Each of the four farms is assumed to own 254 tillable acres valued at $1,200 per acre. The balance of the acreage is rented on a 60-40 crop-share lease with the landlord paying 40 percent of the fertilizer and chemical expenses. Costs of production reflect the 1990 averages for southern Illinois farms that participate in the FBFM record-keeping program. As with the northern and central Illinois farms, these costs were increased by 4 percent to reflect the higher costs expected in 1992.

Projected Results for Southern Illinois Farms

Projected financial outcomes for the southern Illinois cash-grain farms are shown in Table 5. The liquidity position by type of farm is very similar to the outcome for northern and central Illinois cash-grain farms. That is, larger farms have a stronger liquidity position, and the liquidity position is expected to deteriorate in 1992 because of major capital purchases.

Solvency measures suggest that southern Illinois cash-grain farms are likely to experience little change in the D/A ratio in 1992. However, net worth on both a cost- and market-value basis are expected to increase. Increases in net worth, however, are not nearly as strong as those projected for northern and central Illinois. Increases in net worth are expected to be larger as the size of farm increases.

Profitability measures reveal projections of larger incomes as the size of farm increases. However, unlike the northern and central Illinois cash-grain farms, the southern Illinois farms are projected to show lower levels of ROA and ROE as the size of the farm increases. And, for all four sizes of farms, the ROE is well below what could be achieved in a very safe nonfarm investment.

Financial efficiency measures reveal that the ratio of operating expenses to value of farm production (VFP) increases rather sharply as the size of farm increases. This is probably because larger farms rent more land on a 60-40 share-rent arrangement.

Measures of repayment capacity for the southern Illinois farms generated results consistent with the results for northern and central Illinois grain farms. As the size of farm increases, CDRC margin is expected to improve.

Sensitivity Analysis

These projected financial results are quite sensitive to the underlying assumptions used in making the projection estimates. Two of the most uncertain components of these projection estimates are the prices and yields for agricultural commodities. Both variables affect gross revenues. To examine the effects of changes in these key variables, the projection models were reestimated, first with yields 25 percent higher and then 25 percent lower than the original average yield estimates. Prices were not altered in these scenarios. In reality, if yields on all farms were 25 percent above or below average, some offsetting movement in commodity prices would be expected. Therefore, these scenarios should be seen as a change of 25 percent in gross revenue with the change coming from a combination of changes in prices and yields.

Table 6 illustrates how net farm income and the percent returns on equity capital change as the yield estimates are changed. For the northern and central Illinois cash-grain farms, a 25 percent yield change leads to roughly a 100 percent change in net farm income. If you look at the dollar amount of change or the absolute percentage change in returns on equity, the magnitude of the change increases as the size of the farm increases.

Table 4. Economic Factors Associated with Southern Illinois Grain Operations of Various Sizes

Tillable acres	254	533	869	1,636
Acres rented	0	279	615	1,382
Percentage of land owned (tenure)	100	48	29	16
	Annual			
Capital purchases	$ 8,000	$15,000	$34,000	$53,500
Off-farm income	21,000	12,300	11,400	15,200
Operator labor charge	8,550	17,100	22,800	34,200

Table 5. Projected Financial Outcomes for Southern Illinois Cash-Grain Farms in 1992

Performance measure	Size of farm (tillable acres)			
	254	533	869	1,636
Liquidity				
Current assets/current liabilities				
12/31/91	2.71	3.55	3.91	5.08
12/31/92	2.29	2.94	3.13	4.39
Solvency				
Debt-to-asset ratios (market values)				
12/31/91	0.20	0.20	0.20	0.20
12/31/92	0.20	0.20	0.21	0.21
Net worth (market)				
12/31/92	$353,000	$399,000	$443,000	$557,000
12/31/92	362,575	407,328	456,604	585,861
Net worth (cost)				
12/31/91	$229,000	$244,000	$268,000	$351,000
12/31/92	233,545	246,992	273,491	365,885
Profitability				
Net farm income (accrual)	$14,303	$22,526	$27,295	$36,612
Return on assets (market)	3.47%	3.47%	2.88%	2.40%
Return on equity (market)	1.95%	1.61%	1.20%	0.54%
Financial efficiency				
Operating expenses/ value of farm production (VFP)	54.4%	56.2%	60.2%	64.4%
Depreciation/VFP	9.7%	11.8%	15.1%	16.4%
Interest/VFP	12.8%	10.1%	6.7%	5.2%
Repayment capacity				
Capital debt repayment capacity (CDRC)	$10,075	$14,603	$27,904	$54,899
CDRC margin	-559	283	2,066	16,513

Table 6. Sensitivity of Profit Measures to Changes in Yields[1]

Profit measure	Size of farm			
	Northern and central Illinois grain farms			
	256 acres	542 acres	930 acres	1,501 acres
Net farm income				
Average yield	$ 18,167	$ 30,976	$ 43,232	$ 59,915
Yields 25% above average	36,676	59,854	86,118	123,466
Yields 25% below average	-342	2,099	346	-3,635
Return on equity				
Average yield	2.04%	2.66%	3.46%	5.24%
Yields 25% above average	5.72%	7.89%	10.33%	12.41%
Yields 25% below average	-1.73%	-2.75%	-3.73%	-5.48%
	Southern Illinois grain farms			
	254 acres	533 acres	869 acres	1,636 acres
Net farm income				
Average yield	$14,303	$22,526	$27,295	$36,612
Yields 25% above average	28,488	46,033	62,062	97,029
Yields 25% below average	118	-981	-7,472	-23,804
Return on equity				
Average yield	1.95%	1.61%	1.20%	0.54%
Yields 25% above average	6.32%	7.93%	9.44%	11.50%
Yields 25% below average	-2.54%	-4.96%	-7.51%	-11.33%

[1]Projection results are based upon the assumption that average prices do not change as yields change. If all farms experienced the yield change, prices would probably rise or fall in response to this yield change.

For the southern Illinois cash-grain farms, the effects of a yield change increase quite dramatically as the size of farm increases. For the smallest size farm, a 25 percent yield change leads to about a 100 percent change in net farm income. For the largest farm, the same percentage change in yield leads to a much larger percentage change in net farm income. The results suggest that the profitability of grain farms is highly sensitive to yield changes.

Conclusions

Cash-grain farms in Illinois appear to be headed for a year in which farm incomes will be strong but not outstanding. The "average" producer may make a profit, but the returns on equity capital may be lower than what could be achieved in nonfarm investments. The "above-average" producer should do much better than the projection estimates presented here.

These economic scenarios were developed with the aid of the transition planning model. Results are based upon the authors' price and yield assumptions while sizes of farms, production costs, crop rotations, and other factors are based upon FBFM historical records. The model can easily be applied to specific farms or to assumptions that differ from those used in this newsletter.

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Issue 92-5 *February 1992*

Projected Financial Outcomes for Illinois Swine and Dairy Farms in 1992

For Illinois swine and dairy producers, 1991 was a year of highly volatile prices. Market hog prices topped $50 per hundredweight (cwt) during January 1991 but dropped to under $40 per cwt by year's end. At the beginning of the year, milk prices were around $11.50 per cwt; they dropped an additional dollar by June and then moved to around $13.50 per cwt by year's end.

Both dairy and swine producers remain concerned over commodity prices for 1992. The potential for higher grain prices concerns livestock producers, especially those who buy feed grains in addition to their normal purchases of concentrates. Current estimates suggest little improvement during 1992 in hog and fluid milk prices.

Many of the same economic factors that affect cash-grain farmers will also affect livestock producers. Lower interest rates will help ease the financial strain on heavily indebted farms while those farms with nonfarm savings will be adversely affected due to lower returns on savings. Efforts to expand exports are likely to focus on both grains and pork, but dairy producers could be more strongly affected by imports rather than exports.

1992 Projections and Assumptions

This report projects the 1992 financial performance of swine and dairy operations in northern, central, and southern Illinois under a given set of commodity prices and production costs. Table 1 illustrates the commodity prices and farm program assumptions made for 1992.

The figures used in making the projection estimates are based upon averages from the Illinois Farm Business Farm Management (FBFM) record-keeping program. Production costs were determined by taking the 1990 average costs of production for the various sizes and types of farms and increasing those amounts by 4 percent to reflect the higher costs expected for 1992. Other assumptions included interest rates at 8.9 percent for farm real-estate loans and 9.0 percent for farm operating loans. Cash balances of over $10,000 are assumed to be invested off the farm and generate a 5.0 percent annual return. Family living expenses are assumed to be $25,000 for a family of four with $2,250 placed into a retirement account if income is sufficient.

Although leverage ratios vary widely among farms, the farms modeled in this report are all assumed to have an initial debt-to-asset (D/A) ratio of around 20 percent. Land values are assumed to increase 2 percent in 1992.

Assumptions About Swine Farms

Four sizes of swine farrow-to-finish operations, designed to reflect average conditions in northern, central, and southern Illinois, are used in this report. The smaller farms are assumed to have 350 and 326 tillable acres and 90 sows each. These hog operations market 1,270 head of hogs annually. The

Table 1. Commodity Prices Used to Project the Financial Condition of Illinois Livestock Farms in 1992

Commodity	Price
	--dollars per bushel--
Corn	
Target price	$2.75
Cash price	2.40
Deficiency (80% of base acres)	0.35
Soybeans	
Cash price	5.75
Wheat	
Target price	4.00
Cash price	3.25
Deficiency (80% of base acres)	0.75
	--dollars per cwt--
Swine	
Market hogs	42.00
Dairy	13.00

larger operations are assumed to have 995 and 1,074 tillable acres each and to market 3,020 head of hogs per year. Each hog farm feeds a ration of corn produced on the farm and a soybean meal supplement. The feed efficiency ratio is assumed to be 4 pounds of feed per pound of gain. Other costs reflect FBFM averages for the size and location of the operation.

Yields for corn and soybeans are assumed to be 130 and 40 bushels per acre respectively on northern and central Illinois farms. The county ASCS yield is assumed to be 120 bushels per acre for corn. Set-aside requirements for 1992 are 5 percent, and the deficiency payment is made on 80 percent of base acres. The crop mix is assumed to be approximately 66 percent corn on the smaller farms and 60 percent corn on the larger farms. The balance of the tillable acreage is planted to soybeans. Each of the two northern and central Illinois farms is assumed to own 250 tillable acres valued at $1,600 per acre. The balance of the tillable acreage is rented on a 50-50 crop-share lease with the landlord paying half of the fertilizer, chemical, and seed expenses.

Yields for corn, soybeans, and wheat on the southern Illinois farms are assumed to be 110, 34, and 50 bushels per acre, respectively. The county ASCS yield for corn is assumed to be 100 bushels for corn and 45 bushels per acre for wheat. Each of the two southern Illinois farms are assumed to own 200 tillable acres valued at $1,000 per acre. The balance of the acreage is rented on a two-thirds/one-third share rental arrangement.

Table 2 illustrates the acreage, number of sows, number of market hogs sold annually, capital expenditures, family living expenses, nonfarm income, hired labor expenses, and an operator labor charge for unpaid family labor. Capital purchases of machinery and equipment reflect an amount equal to 60 percent of the 1990 FBFM average for an operation of this size. The lower capital expenditures number was used to reflect the much lower hog prices and the conservative

Table 2. Economic Factors Associated with the Size of Northern and Central Illinois Swine Farms

	Northern and central Illinois swine farms		Southern Illinois swine farms	
Tillable acres	344	995	326	1,074
Number of sows	90	200	90	200
		annual		
Market hogs sold	1,270	3,020	1,270	3,020
Capital purchases	$13,800	$41,100	$11,900	$27,600
Family living expenses	25,000	29,400	25,000	29,400
Off-farm income	6,375	7,400	5,250	7,400
Hired labor expenses	5,400	37,600	4,700	26,800
Operator labor charge	19,240	26,400	19,240	26,400

attitude toward building and machinery purchases. The operator labor charge is calculated by taking $1,425 times the number of operator labor months for each farm. This estimate is then used in the calculation of returns on assets and the returns on equity capital. The differences in capital expenditures, nonfarm income, and labor expenses reflect differences that exist by size and location of operation.

Projected Results for Swine Farms

Table 3 illustrates the projected financial outcomes for Illinois swine farms in 1992. Results are reported using the five major categories of financial performance measures that have been suggested by the Farm Financial Standards Task Force.

Liquidity for farming operations is often measured as the ratio of current assets (CA) to current liabilities (CL). This ratio measures the degree to which the farming operation is likely to be able to generate cash to pay off current financial obligations as they come due. A ratio above 2:1 is usually considered excellent. As shown in Table 3, all four farms started in a strong liquidity position and actually improved their liquidity position during the year.

Solvency is a measure of the degree to which the operation is financed by external sources of funds and what would be left in the business if it were liquidated. A common measure of solvency is the D/A ratio. This ratio was initially set at 0.21 or 21 percent for all farms and is expected to change very little during 1992.

Another way of measuring solvency is to look at net worth measured at either cost or market value. Market net worth is projected to rise for all four of the farms with much of the increase due to the underlying assumption of a 2 percent increase in land values. Changes in cost-basis net worth reflect how much of the profit, if any, earned by the farm family was retained in the business. The projection estimate reveals a very modest increase for the smaller farms and a somewhat larger increase for the larger farms. These results suggest that the average swine farm is likely to retain some profit after family living expenses, even with hogs at $42 per cwt.

Projected net farm income ranges from $27,597 on the smaller southern Illinois farms to $47,372 on the larger southern Illinois farms. These incomes are much lower than in recent years when hog prices were higher. Another way to evaluate profitability is to examine the ratio measures return on asset (ROA) and return on equity (ROE). ROA measures the returns to all assets, even though those returns get split between the owners of the business and their lenders. In contrast, ROE

Table 3. Projected Financial Outcomes for Northern, Central, and Southern Illinois Swine Farms in 1992

Performance measures	Northern and central Illinois		Southern Illinois	
	350 acres	995 acres	326 acres	1,074 acres
Liquidity				
Current assets/current liabilities				
12/31/91	3.65	5.85	3.78	6.03
12/31/92	4.00	5.93	3.90	6.02
Solvency				
Debt-to-asset ratio (market values)				
12/31/91	0.21	0.21	0.21	0.21
12/31/92	0.19	0.21	0.20	0.20
Net worth (market)				
12/31/91	$484,346	$645,114	$361,746	$528,594
12/31/92	500,223	692,053	369,681	558,545
Net worth (cost)				
12/31/91	$348,346	$483,114	$247,746	$393,954
12/31/92	354,040	493,082	250,150	408,854
Profitability				
Net farm income (accrual)	$31,085	$37,784	$27,597	$47,372
Return on assets (market)	4.35%	4.98%	4.45%	5.76%
Return on equity (market)	2.71%	1.91%	2.70%	4.26%
Financial efficiency				
Operating expenses/ value of farm production	55.1%	66.2%	56.7%	66.1
Depreciation/value of farm production	12.2%	14.1%	10.6%	12.3%
Interest/value of farm production	9.5%	6.6%	8.6%	5.3%
Repayment capacity				
Capital debt repayment capacity (CDRC)	$20,534	$45,053	$13,164	$45,931
CDRC margin	4,270	11,220	-116	20,729

measures the returns to equity capital invested by the owners. ROA is highest on the larger farms, but ROE is higher on the smaller northern and central Illinois farms than on the larger farms in the same region. However, ROA exceeds ROE for all four farms, suggesting that lenders are getting a greater percentage return on debt capital than the owner is getting on equity capital. Ideally, businesses should be able to generate a higher ROE than ROA.

Financial efficiency measures for the four farms appear to be within the normal range of outcomes for swine farms. The projection results suggest that depreciation/value of farm production (VFP) and operating expenses/VFP increase as the size of the swine operation increases.

Repayment capacity measures the capacity—but not the cash—available to pay off capital debts and acquire new capital assets. Capital debt repayment capacity (CDRC) margin reflects the amount of capacity left after the payment of scheduled principal payments on existing debt and cash purchases of new capital assets. CDRC margin is positive by a comfortable margin for all farms except the smaller southern Illinois farms. The CDRC margin is, however, strongly influenced by the percentage of new capital purchases that are financed.

Assumptions About Dairy Farms

Two different sizes of dairy farms were modeled for this report. Table 4 illustrates some of the key assumptions used in modeling the two farms. The smaller farm is assumed to have a 56-cow milking herd while the larger operation has a 102-cow herd. The yearly average milk production is assumed to be 17,000 pounds per cow. Calves not kept for replacement are sold at an average weight of 200 pounds. The cows are fed a ration of corn, dairy supplement, and haylage. Average milk prices for 1992 are assumed to be $13.00 per cwt. Production costs reflect the 1990 FBFM averages increased by four percentage points to reflect the higher costs expected for 1992.

The crop yields and costs of production are the same as those used for the northern and central Illinois hog farms. Each of the two farm operators is assumed to own 250 tillable acres with the balance of the tillable acreage rented on a 50-50 crop-share basis.

Projected Results for Dairy Farms

The projected financial outcomes for Illinois dairy farms are shown in Table 5. The liquidity position of both farms is strong; it improves slightly on the larger farm but declines slightly on the smaller farm.

Solvency measures suggest little change in the D/A ratio for 1992. However, both cost and market net worth are expected to grow nicely on both farms during 1992. The relatively large growth in cost-basis net worth is particularly impressive because it shows that these farms are likely to retain a significant part of their profit in the business.

Profitability ranges from $52,926 on the smaller farm to $68,736 on the larger farm. In comparison to the income projections for grain farms and hog farms, these estimates suggest that dairy farms may be among the most profitable types of farm businesses in Illinois during 1992.

Returns on assets (ROA) and returns on equity (ROE) are also the highest of any of the farm types modeled. For the smaller farm, ROE is projected at 5.23 percent while for the larger farm it is projected at 6.73 percent. Both of these figures are above the level of returns now available in certificates of deposit, but both farms still have a higher ROA than ROE. Again, this tells us that lenders are getting a higher percentage return on the capital they have invested in the farm than the farmers are getting for the capital that they have invested in their farms.

Financial efficiency measures are all within the normal range for farms of this type. Likewise, CDRC margin is quite high on both farms, suggesting that dairy farms should have no trouble supporting the current levels of debt and the planned amount of capital purchases.

Table 4. Economic Factors Used in Modeling Illinois Dairy Farms

	56 cows	102 cows
Tillable acres	287	454
	------------*annual*------------	
Capital purchases	$21,000	$45,000
Family living expenses	25,000	25,000
Off-farm income	4,100	5,250
Hired labor expenses	7,400	20,650
Operator labor charge	25,000	30,000

Table 5. Projected Financial Outcomes for Illinois Dairy Farms in 1992

	Size of farm (number of cows)	
Performance measure	56	102
Liquidity		
Current assets/current liabilities		
12/31/91	2.70	2.98
12/31/92	2.64	3.11
Solvency		
Debt-to-asset ratio (market values)		
12/31/91	0.20	0.20
12/31/92	0.20	0.21
Net worth (market)		
12/31/92	$502,217	$596,509
12/31/92	529,130	647,924
Net worth (cost)		
12/31/91	$355,217	$448,509
12/31/92	374,131	478,319
Profitability		
Net farm income (accrual)	$52,926	$68,736
Return on assets (market)	6.24%	7.42%
Return on equity (market)	5.23%	6.73%
Financial efficiency		
Operating expenses/value of farm production	49.2%	51.8%
Depreciation/value of farm production	10.8%	16.4%
Interest/value of farm production	7.8%	5.9%
Repayment capacity		
Capital debt repayment capacity (CDRC)	$33,992	$71,001
CDRC margin	13,674	36,322

Conclusions

Illinois swine farms appear to be headed for a relatively poor income year as a result of much lower hog prices. However, if hogs hit the $42 per cwt average used in our projection estimates, the swine farms should still experience very limited improvement in their financial position.

The outlook for dairy farms appears to be more favorable. Incomes should be strong, and returns on equity capital may well exceed the returns that could be earned in nonfarm investments. However, as recent experience has shown, virtually all agricultural commodity prices including milk are subject to wide variation in relatively short periods of time. Another downturn in milk prices would certainly lower the financial prospects for Illinois dairy farmers.

The economic scenarios presented here were developed with the aid of the transition planning model. Results are based upon the author's price and yield assumptions while sizes of farms, costs, crop rotations, and other production factors are based upon FBFM historical records. The model can easily be applied to specific farms or to assumptions that differ from those used in this newsletter.

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Issue 92-6 *March 1992*

Analyzing Decisions to Participate in the 1992 Acreage Reduction Program

In 1992, farmers are again faced with major decisions regarding the acreage reduction program (ARP). First, should a farm operator and/or landowner participate in ARP? Second, should he plant an alternative crop on flex acreage? Third, is the 0/92 option viable? These issues are examined for conditions in both northern and southern Illinois.

To evaluate alternative participation decisions, expected average yields and costs are presented for two regions of Illinois. Individual crop return estimates for 1992 are presented in Table 1. Examples are provided for average production conditions in both northern and southern Illinois. The yield and variable costs for these examples are based on the conservation tillage budgets published in AE-5683, *Crop and Livestock Budgets*, available from county Extension offices or the Department of Agricultural Economics, University of Illinois, 305 Mumford Hall, 1301 West Gregory Drive, Urbana, IL 61801. Market prices reflect the current new crop futures prices for corn, soybeans, and wheat. These prices may under- or overstate the deficiency payments that will be realized for the 1992 crops. The net return values are the per-acre net return above variable cost, and they reflect the net return to both the owner and operator before land charges, depreciation, management, and taxes. As shown in Table 1, corn is expected to be, on average, the most profitable crop in 1992, even before deficiency payments are considered.

Table 1. Expected Crop Yields, Costs, and Net Returns on Farms in Northern and Southern Illinois

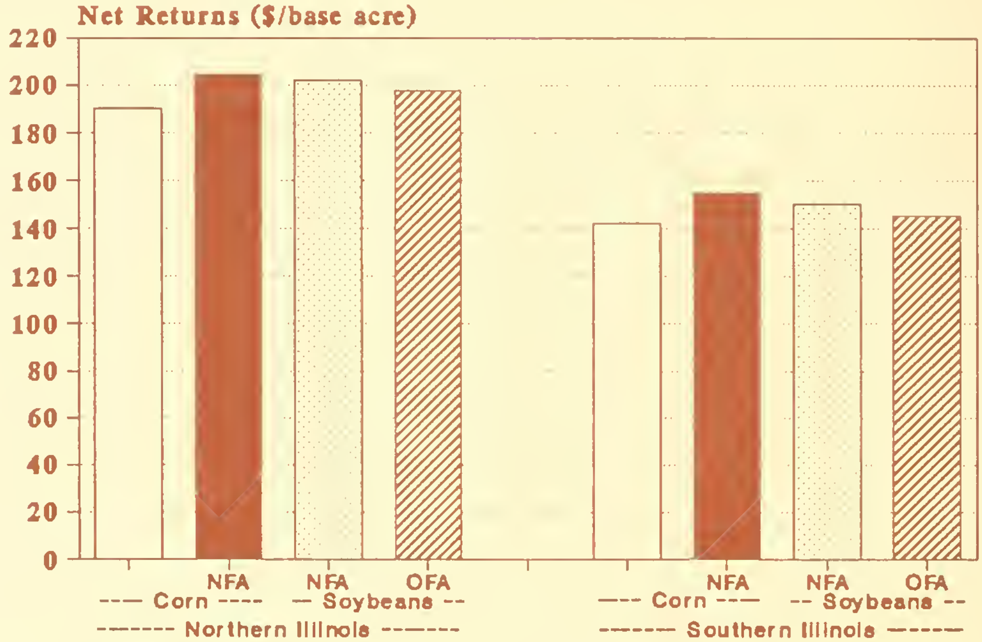
	Expected yield (bu/acre)	Market price ($/bu)	Variable cost ($/crop acre)	Net return ($/crop acre)
		Northern Illinois		
Corn	145	2.50	172	190.50
Soybeans	45	5.80	84	177.00
Wheat	60	3.65	88	131.00
		Southern Illinois		
Corn	115	2.50	145	142.50
Soybeans	34	5.80	80	117.20
Wheat	50	3.65	84	98.50

Normal and Optional Flex-Acre Choices

Figures 1 and 2 depict the expected net returns from the various participation options in 1992. Four options are presented in Figure 1: (1) no ARP participation; (2) corn planted on normal flex acres (NFA); (3) soybeans planted on NFA; and (4) soybeans planted on the normal and optional flex acres (OFA). In addition to the information given in Table 1, the ASCS established yields are 120 and 100 bushels per acre for corn and 45 and 40 bushels per acre for wheat in northern and southern Illinois, respectively.

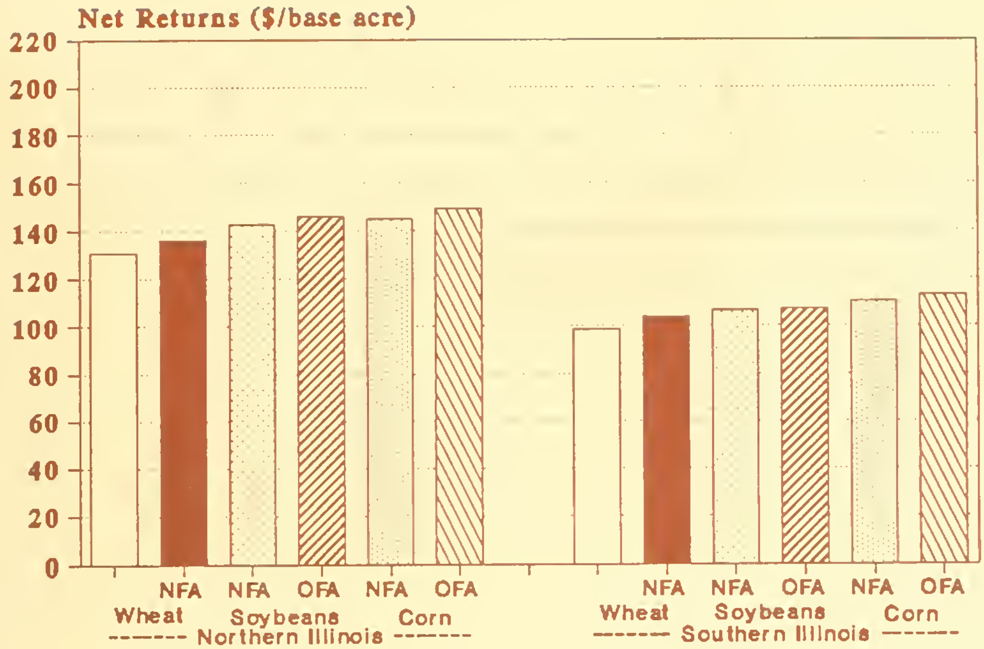
Corn planted on NFA (option 2) generates the highest expected returns of $204.03 and $154.43 per base acre for northern and southern Illinois, respectively. As shown in the attached example worksheet, this option will require putting 95 percent of the base acres in corn and 5 percent in set-aside for ARP. The number of crop payment acres in the program is 80 under all the NFA options. Options 2 and 3 generate deficiency payments of $24 and $20 per base acre in the two examples. If the OFA choice is selected, the payment acres decrease to 70 and the deficiency payments decrease to $21.00 and $17.50 per base acre.

Under the wheat program, two more options are presented: (5) corn planted on NFA and (6) corn planted on NFA and OFA. At this time, most wheat producers will not have the flexibility to alter their 1992 acreage. However, options 3 through 6 may be viable in 1992 if a producer underplanted the wheat base acreage in the fall of 1991 or if he was unable to plant the crop or lost the crop due to unfavorable weather. Option 2 has an expected net return of $136.10 and $103.83 per base acre for northern and southern Illinois, respectively. If options 3 through 6 are feasible, the highest returns—$149.40 and $113.43, respectively—may be achieved by planting 25 percent of the wheat base to corn.



NOTE: NFA = normal flex acres; OFA = optional flex acres.

Figure 1. Expected net returns for the corn participation options.



NOTE: NFA = normal flex acres; OFA = optional flex acres.

Figure 2. Expected net returns for the wheat participation options.

Break-even Prices

Table 2 presents approximate break-even commodity prices for the six options previously identified. All of the choices are presented relative to option 2, which is participation in the ARP with the program crop (corn or wheat) planted on the NFA. In each case, the yields and costs are those presented in Table 1. Only the price of the commodity identified in the column heading varies. For example, the first break-even prices indicate that if the deficiency rate for corn is $0.12 ($2.75 minus $2.63) and the average price received is $2.63, then the net returns from the ARP will equal the returns of option 2 (ARP with corn on NFA).

The $2.50 corn price for option 2 indicates that a market price of $2.50 per bushel and a deficiency payment of $0.25 per bushel are used in the break-even comparisons with options 3 and 4. Relative to the corn price of $2.50 per bushel, it may be advantageous to plant the NFA to soybeans if the soybean price is above $6.10. Likewise, if the soybean price rises above $6.37 and corn remains at $2.50, net returns will increase under the additional 10 percent OFA planted to soybeans. The soybean break-even prices are higher in southern Illinois due to higher per-bushel variable cost.

The bottom part of Table 2 indicates that the current new crop wheat prices are near but still below the break-even price of approximately $3.80 when a producer should consider withdrawing from the ARP. The table also indicates that corn and soybean prices are well above the levels at which a producer should consider planting wheat-base NFA and OFA to corn or soybeans. Again, it may be too late to take advantage of this option in many cases, but it should be re-evaluated for the 1993 wheat crop. Farm operators should also consider the relative yields on soils that may be more suited to wheat production and any machinery and/or labor limitations resulting from shifting wheat acreage to corn or soybeans.

The 0/92 Alternative

Figure 3 presents two options for corn and wheat under the 0/92 program. All cases are examined with the required 5 percent ARP and 15 percent NFA planted to soybeans. The

Table 2. Approximate Break-even Prices for Various Participation Options in the Acreage Reduction Program

	Northern Illinois		*Southern Illinois*	
	Corn	Soybeans	Corn	Soybeans
not in ARP	2.63	...	2.64	...
ARP with NFA	2.50	6.10	2.50	6.55
ARP with OFA	...	6.37	...	6.84

	Wheat ($/bu)	Soybeans ($/bu)	Corn ($/bu)
	Northern Illinois		
not in ARP	3.78	...	...
ARP with NFA	3.65	4.80	2.09
ARP with OFA	...	4.92	2.14
	Southern Illinois		
not in ARP	3.81	...	...
ARP with NFA	3.65	5.25	2.12
ARP with OFA	...	5.42	2.17

NOTE: ARP = acreage reduction program; NFA = normal flex acres; OFA = optional flex acres.

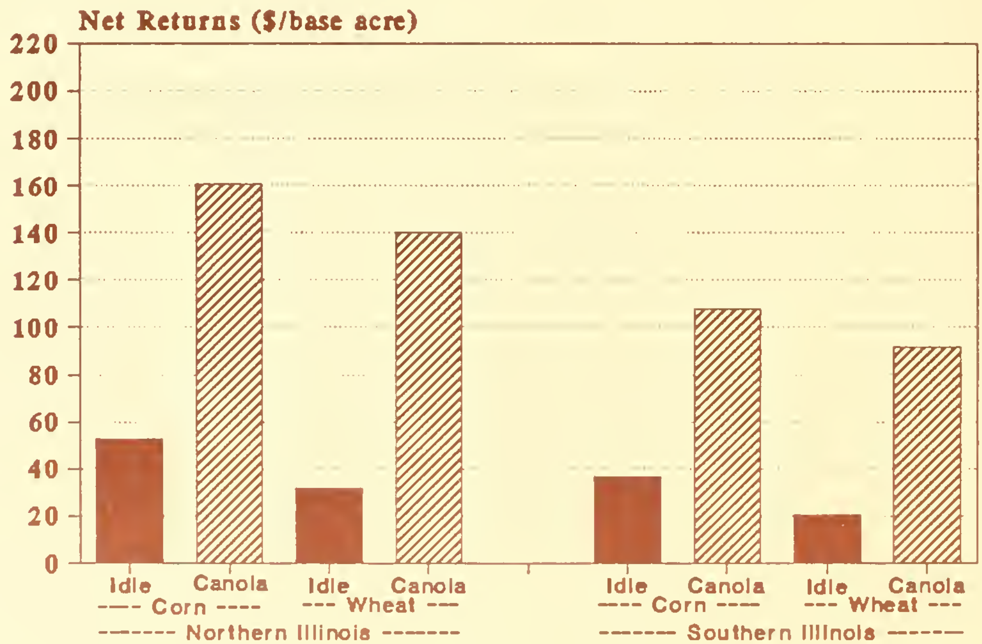


Figure 3. Expected net returns for the 0/92 options.

1992 Government Program Worksheet
Instructions

To take full advantage of the flexibility allowed by the 1990 Farm Bill, the farmer must learn about the program and analyze the options that are available. This worksheet is to help analyze options.

The worksheet is arranged in 3 columns (labeled a, b, and c across the top) and 18 rows (labeled down both sides). The worksheet is organized into five sections--each with a heading enclosed in dashed lines. Formulas are provided for all computations that must be performed--for example, ARP acres (cell 8a) are computed by multiplying cell 7a by cell 1a. In the formulas, perform the math *within* parentheses first and note that * means multiply.

Program Requirements

ARP: percent of "base" acres that must be set aside.

NORMAL FLEX: percent of "base" for which deficiency payment will *not* be made and on which any crop but fruits and vegetables may be planted.

OPTIONAL FLEX: additional percent of "base" on which farmer *may choose* to forego deficiency payment in order to plant some other crop.

Yield, Price, and Cost Information

Information is entered on the program crop, on one or two nonprogram alternatives, and on providing protective cover to idle land.

Prog Crop and NP Crop: Blank lines are provided to record the name of the "program" and "nonprogram" crops being analyzed.

Expected yield: own yield expectation for each crop.

Mkt price: expected market price for each crop.

Var. cost: variable costs of production for each crop and for idle land.

Program yield: program yield announced by county ASCS office.

Def rate: expected total deficiency payment (per-acre rate) announced by county ASCS office.

Program Limits

BASE: acres of "program base" on the farm.

ARP: acres of "base" to be set aside (computed).

Min FLEX: acres of "base" that *must* be in normal flex (computed).

Max FLEX: acres in NORMAL FLEX plus acres in optional flex (computed).

Max 0/92: maximum acres of "base" eligible for 0/92 option (computed).

Planting Options

In this section, the user must account for all "permitted" acres (base ARP) while satisfying requirements set by the Program Limits section. The FLEX column must contain at least Min FLEX and no more than Max FLEX acres. 0/92 may contain as many as Max 0/92 acres. Harvested crops on 0/92 acres are restricted to minor oilseed crops. Line 12, Prg Crop, computes the payment acres planted to the program crop. Negative Prg Crop acres (12c) indicates an overallocation of acres to FLEX and/or 0/92. The same acres may not be in both.

Payments and Returns

This section computes the effects of the acreage allocations made.

Deficiency payment: Use either formula, depending on whether the 0/92 option is taken.

Crop returns: Net returns for each crop (and cost of set-aside) are computed separately on lines 14-17.

N.R. above var. cost: The total of lines 13-17 is the net return above variable costs for all acres in the program base.

U of I FaRM Lab

1992 Government Program Worksheet

row	column		a		b		c	row
			Program Requirements					
			ARP		NORMAL FLEX		OPTIONAL FLEX	
1			0.050		0.150		0.100	1
			Yield, Price & Cost Info					
	Prog Crop	Corn						
2		*Expected Yield*	145	*Mkt Price*	2.50	*Var. Cost*	172	2
3		*Program Yield*	120	*Def Rate*	0.25			3
	NP Crop 1	Soybeans						
4		*Expected Yield*	45	*Mkt Price*	5.80	*Var. Cost*	84	4
	NP Crop 2	Wheat						
5		*Expected Yield*	60	*Mkt Price*	3.65	*Var. Cost*	88	5
6	Idle					*Var. Cost*	19	6
	Program Limits			**Planting Choices**				
			acres		FLEX		0/92	
7	*BASE*		100	Prog Crop			N/A	7
8	*ARP*	7a*1a	5	NP Crop 1	15			8
9	*Min FLEX*	7a*1b	15	NP Crop 2				9
10	*Max FLEX*	7a*(1b+1c)	25	Idle				10
11	*Max 0/92*	7a-8a-9a	80	TOTAL	15			11
12				*Prg Crop*	7a-8a-11b-11c		80	12

Payments and Returns

row			b	row
	Deficiency Payment			
13	*w/o 0/92*	(12c*3a*3b)	2400	13
	with 0/92	(12c+11c)*3a*3b*0.92		
	Crop Returns			
14	*Prg Crop*	(2a*2b-2c)*(12c+7b)	15240	14
15	*NP Crop 1*	(4a*4b-4c)*(8b+8c)	2655	15
16	*NP Crop 2*	(5a*5b-5c)*(9b+9c)		16
17	*Idle Cost*	6c*(8a+10b+10c)	-95	17
18	N.R. above Var Cost (13b+14b+15b+16b-17b)		20200	18

two alternatives considered are: (1) idle the remaining 80 percent base or (2) plant canola (a minor oilseed crop) on 80 percent of the base. The canola yields used in this example are 40 and 30 bushels per acre for northern and southern Illinois, respectively. The canola market price is set at $5.00 per bushel, and expected deficiency rates for 0/92 are $0.48 and $0.65 for corn and wheat, respectively.

Compared to options presented in Figures 1 and 2, 0/92 is a competitive alternative in only one of the eight cases. Canola planted on a 0/92 wheat base provides an expected net return of $139.92 per base acre in northern Illinois. However, these returns are very much dependent on realizing a 40-bushel canola yield with a $5.00-per-bushel market price. Depending on soil conditions, weather, canola production experience, and available markets, these production and market assumptions may be overly optimistic. There may, however, be other factors (drought, excessive moisture, and so forth) that provide incentives for considering the 0/92 option. The attached worksheet may also be used to explore alternative options under 0/92.

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U of I FaRM Lab

1992 Government Program Worksheet

row	column		a		b		c	row
			------------ Program Requirements ------------					
			ARP		NORMAL FLEX		OPTIONAL FLEX	
1					0.150		0.100	1
			------------ Yield, Price & Cost Info ------------					
	Prog Crop							
2		*Expected Yield*		*Mkt Price*		*Var. Cost*		2
3		*Program Yield*		*Def Rate*				3
	NP Crop 1							
4		*Expected Yield*		*Mkt Price*		*Var. Cost*		4
	NP Crop 2							
5		*Expected Yield*		*Mkt Price*		*Var. Cost*		5
6	Idle					*Var. Cost*		6

row	--------- Program Limits ---------		acres	--------- Planting Choices ---------	FLEX	0/92	row
7	*BASE*			Prog Crop		N/A	7
8	*ARP*	7a*1a		NP Crop 1			8
9	*Min FLEX*	7a*1b		NP Crop 2			9
10	*Max FLEX*	7a*(1b+1c)		Idle			10
11	*Max 0/92*	7a–8a–9a		TOTAL			11
12				*Prg Crop*	7a–8a–11b–11c		12

---------------- Payments and Returns ----------------

row				row
	Deficiency Payment			
13	*w/o 0/92*	(12c*3a*3b)		13
	with 0/92	(12c+11c)*3a*3b*0.92		
	Crop Returns			
14	*Prg Crop*	(2a*2b–2c)*(12c+7b)		14
15	*NP Crop 1*	(4a*4b–4c)*(8b+8c)		15
16	*NP Crop 2*	(5a*5b–5c)*(9b+9c)		16
17	*Idle Cost*	6c*(8a+10b+10c)		17
18	N.R. above Var Cost (13b+14b+15b+16b–17b)			18

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Cooperative Extension Service

FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 92-7 *May 1992*

Cost of Growing Corn and Soybeans in 1991

In 1991, the total of all economic costs per acre for growing corn in Illinois averaged $339 in the northern section, $344 in the central section with higher soil ratings, $305 in the central section with lower soil ratings, and $257 in the southern section. The soybean costs per acre were $271, $278, $243, and $207 respectively (Table 1). Costs were lower in the southern section primarily because land costs are lower there. The total of all costs per bushel in the different sections of the state ranged from $2.63 to $3.17 for corn and from $5.59 to $6.78 for soybeans. Variations in this cost were related to weather factors, yields, and land quality.

These figures were obtained from farm business records kept by farmers enrolled in the Illinois Farm Business Farm Management Association. The samples included only farms with more than 260 acres of productive and nearly level soils in each area of the state; these are farms without livestock. Farms located in 22 counties north and northwest of the Illinois River are included in the sample for northern Illinois. Farms from 36 counties below a line from about Mattoon to Alton are in the sample for southern Illinois. The remaining 44 counties make up the sample for central Illinois (Figure 1). The sample farms averaged 723 tillable acres in northern Illinois, 760 acres in the central section with high soil ratings, 817 acres in the central section with lower soil ratings, and 979 acres in southern Illinois.

This economic analysis includes some factors in the cost of doing business that

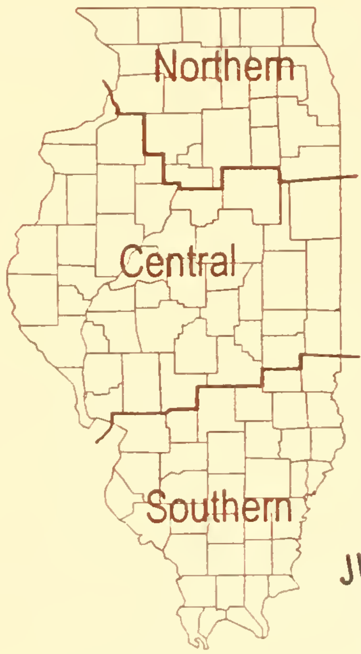

Figure 1. Geographical distribution of farms in this study.

nonagricultural businesses may not include. These factors are not used as expense items on income tax returns. Examples include the charge for labor performed by the farm operator, a rental charge for the use of owned and rented land, and an interest charge on equity in machinery and inventories of grain and livestock. In the short run, farm operators may continue to produce without covering these total economic costs of production. However, if returns do not equal the total economic cost of production in the long run, it will be difficult to maintain the same

Table 1. Cost per Acre of Growing Corn and Soybeans on Illinois Grain Farms Without Livestock in 1991

	Corn				Soybeans			
	North	Central[1]	Central[2]	South	North	Central[1]	Central[2]	South
Number of farms	345	631	308	253	345	631	308	253
Acres in crop	397	368	392	394	267	352	364	381
Nonland Costs								
Variable costs:								
Soil fertility	$ 53	$ 55	$ 52	$ 50	$ 17	$ 18	$ 17	$ 17
Pesticides	25	24	22	20	26	25	24	22
Seed	25	23	23	19	13	13	12	12
Drying and storage	7	8	5	2	2	4	3	1
Repairs, fuel, and hire	28	27	26	29	22	23	22	26
Total, variable costs	$ 138	$ 137	$ 128	$ 120	$ 80	$ 83	$ 78	$ 78
Percent change from 1990	-6	-1	-2	-11	-4	1	-2	-11
Other nonland costs:								
Labor	$ 28	$ 29	$ 28	$ 29	$ 28	$ 27	$ 25	$ 27
Buildings and storage	9	6	5	5	6	3	3	3
Machinery depreciation	20	19	16	17	16	15	13	14
Nonland interest	24	23	17	16	21	20	14	15
Overhead	13	12	13	9	13	12	12	9
Total, other costs	$ 94	$ 89	$ 79	$ 76	$ 84	$ 77	$ 67	$ 68
Total, nonland costs	$ 232	$ 226	$ 207	$ 196	$ 164	$ 160	$ 145	$ 146
Percent change from 1990	-6	-3	-6	-10	-5	-2	-6	-11
Land costs								
Taxes	$ 18	$ 20	$ 16	$ 8	$ 18	$ 20	$ 16	$ 8
Annually adjusted net rent	89	98	82	53	89	98	82	53
Total land cost	$ 107	$ 118	$ 98	$ 61	$ 107	$ 118	$ 98	$ 61
Total, all costs	$ 339	$ 344	$ 305	$ 257	$ 271	$ 278	$ 243	$ 207
Percent change from 1990	-4	-1	-4	-8	-2	-1	-4	-8
1991 yields, bushels per acre	107	131	98	95	40	46	36	37
Nonland cost per bushel	$ 2.17	$1.73	$2.11	$ 2.06	$ 4.10	$ 3.48	$ 4.03	$ 3.95
Total, all costs per bushel	$ 3.17	$2.63	$3.11	$ 2.71	$ 6.78	$ 6.04	$ 6.75	$ 5.59
1988-1991 average yield	116	127	107	106	41	43	38	35
Nonland cost per bushel	$2.00	$1.78	$1.93	$1.85	$4.00	$3.72	$ 3.82	$ 4.17
Total, all costs per bushel	$2.92	$2.71	$2.85	$2.42	$6.61	$6.47	$ 6.39	$ 5.91

NOTE: The entries shown below the line are costs based on 1988-1991 average yields.

[1] Soil productivity ratings of 86 to 100.

level of resources in the farm firm. In addition, producers will be challenged to lower their cost of production and/or increase volume as profit margins remain narrow.

Nonland Costs

Soil fertility costs for soybeans were allocated on the basis of phosphorus, potassium, and lime removal, with the residual cost allocated to corn. The seed, crop, pesticide, and drying expenses also included some commercial drying and storage and the estimated value of home-raised seed. The costs of fuel, machine hire, and machinery repair were reduced for income received from custom work. Labor costs included the cash value of hired labor, plus a charge for available unpaid labor at a rate of $1,425 per month. This rate represents a charge for only the physical labor input, not including a charge for management. Building and storage costs were for repairs and depreciation only. The nonland interest rate in 1991 was set at 9 percent; this figure was then multiplied by the sum of half the average inventory value of crops at the beginning and the end of the year, the depreciated value of machinery and buildings, and half the total operating expenses. The result is the total nonland interest charge. Overhead costs included insurance, utilities, the farm share of light vehicle expenses, and miscellaneous items. As mentioned above, no charge has been made in this analysis for management, but it may normally be about 5 percent of the total cost per bushel, or 10 to 15 cents for corn and 25 to 30 cents per bushel for soybeans.

Land Costs

Land costs included the adjusted net rent and the real estate taxes. Net rent was represented as the average rent received by crop-share landlords on record-keeping farms for the period 1987 to 1990. Caution is needed in interpreting differences in land costs between areas. In the long run, the net rent residual return to landowners should tend to equalize the total cost of production.

Cost per Bushel

Production costs per bushel of corn increased in 1991 for all areas of the state compared to 1990 due to lower yields. The increase in costs per bushel ranged from $0.29 in southern Illinois to $0.78 on the central Illinois farms with lower soil ratings. The average corn yield in 1991 was 17 bushels per acre lower than for 1990 in southern Illinois, 28 bushels lower in northern Illinois, and 18 to 38 bushels per acre lower in central Illinois. The 1991 average corn yield in northern Illinois, southern Illinois, and central Illinois with lower soil ratings was 9 to 11 bushels per acre below the four-year average from 1988 to 1991 while the average yield on central Illinois farms with higher soil ratings was 4 bushels per acre above the four-year average. Total costs per acre decreased in all four areas of the state, ranging from a 1 percent decrease in central Illinois to a 8 percent decrease in southern Illinois. Most of the decrease in costs occurred in selected machinery costs and nonland interest charges.

Production costs per bushel of soybeans also increased in 1991 compared to 1990 for most areas of the state as a result of decreased yields. The one exception was in southern Illinois where the cost per bushel was lower. The increase in costs per bushel ranged from $0.08 on central Illinois farms with higher rated soils to $1.15 on central Illinois farms with lower rated soils. Costs per bushel in southern Illinois decreased by $0.87 with yields 2 bushels per acre higher than the year before. Average soybean yields in northern and central Illinois decreased by 1 to 9 bushels per acre. Total costs per acre decreased from 1 to 8 percent. Average soybean yields in southern Illinois and on central Illinois farms with higher rated soils were 2 to 3 bushels per acre higher than the four-year average from 1988 to 1991. Soybean yields in northern Illinois and on central Illinois farms with lower rated soils were slightly below the four-year average.

Total costs per acre to produce corn decreased as compared to the year before and were at their lowest level for any of the last ten years. These costs have been declining from 1982 through 1991, decreasing from $380 to $320 per acre (Figure 2). Most of this decrease occurred in machinery depreciation and interest charges. Cash costs such as fertilizer, pesticides, and seed declined very little during this period. Cash costs have varied from $142 to $130 per acre. Total cost per acre to produce soybeans also decreased, dropping from $267 per acre in 1990 to $259 per acre in 1991 (Figure 3). Total costs per acre were $297 in 1982. All of this decrease

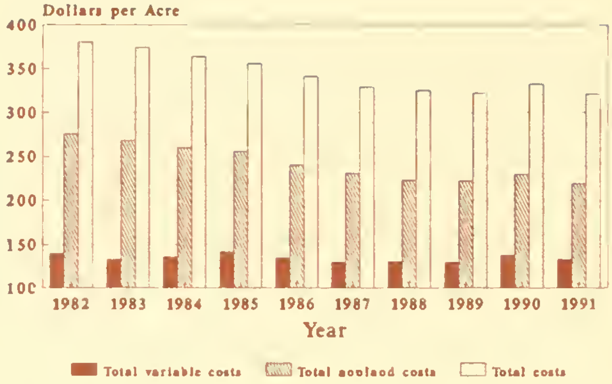

Figure 2. Total costs per acre to grow corn on Illinois grain farms.

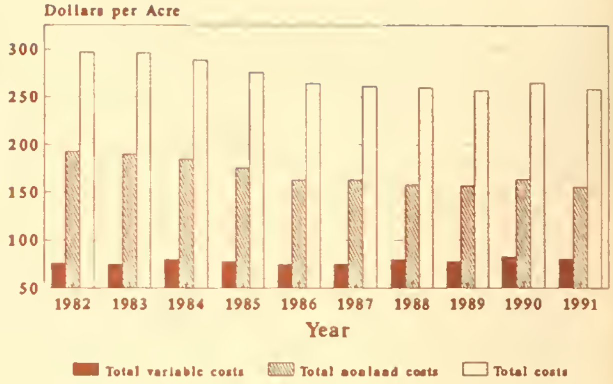

Figure 3. Total costs per acre to grow soybeans on Illinois grain farms.

had come from the other nonland (machinery depreciation and nonland interest) and landcosts. Variable costs have actually increased slightly since 1982. The factors that reduced the total cost per acre to produce corn were also the factors reducing soybean costs. After an extended period of moderately declining costs per acre during the early and mid-1980s, total costs seem to be leveling off. Lower interest rates, reduced capital expenditures, a shift towards no-till or reduced tillage operations, and an increase in the size of farms, which utilizes labor and machinery more efficiently, are all reasons for the reduction in total costs per acre that have occurred during the last ten years.

Current selling prices for corn and soybeans are below the average total 1991 cost of production when using the average yield for the past four years. It should be noted that this four-year period includes the drought years of 1988 and 1991 when yields were reduced significantly. An owner-operator with average yields during the past four years (1988 to 1991) would need $1.08 to $1.20 per bushel for corn and $1.93 to $2.23 per bushel for soybeans to recover the variable costs listed in Table 1. Recovering the total of all costs would require receiving $2.42 to $2.92 a bushel for corn and $5.91 to $6.61 a bushel for soybeans. Individual tenants and landowners computing the average break-even cost per bushel for growing corn and soybeans should divide the costs and yields shown in Table 1 as they are shared by the terms of the lease.

Farmland values generally are related to grain prices and the nonland costs of production because under traditional crop-share leases, income left after other costs have been deducted is considered the return to land. Even with fixed cash-rent leases, grain prices and nonland costs of production will have a bearing on what farm operators will be willing to pay to cash rent land, which in turn effects farmland values. Values for Illinois farmland increased by about 22 percent during the past four years after having declined by almost 50 percent since 1979, although land value increases the past two years have been relatively minor. The increase in land values was due in part to improved farm earnings and a return to farmland that was more competitive with alternative nonfarm investments. Farm earnings for 1991 will be lower for most areas of the state when compared to 1990. Some areas suffered significantly due to drought conditions. The financial side of the agricultural sector has been improving until this year from the financial stress of the early and mid-1980s. Farm operators will need to continue to monitor their financial conditions closely and avoid an excessive level of borrowed capital to finance their businesses. Risk management will be more important to farm operators as profit margins are narrower and crop yields seem more variable due to fluctuating weather conditions. Along with this, support from government farm programs can be expected to decrease. To remain competitive in the future, farm operators will need to continue to monitor and control costs, use borrowed capital wisely, reduce risk when possible, and adopt new technologies that will economically increase the productivity of their farm businesses.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 92-8 *June 1992*

The Financial Position of Illinois Farm Operators: Costs and Returns from Crop and Livestock Enterprises

Farm Earnings in 1991 Drop Considerably Compared to 1990

This report, based on the summaries of Illinois Farm Business records, reviews the financial status of Illinois farm operators. Farm operator earnings decreased substantially in 1991 compared to 1990 and were at their second lowest level of any of the last five years (Figure 1). The lower returns were a result of reduced crop yields, especially for corn and wheat, and lower livestock and livestock product prices. The average corn yield for all farms in the study was 111 bushels per acre, compared to 132 bushels per acre in 1990. Gross crop returns for grain farms were $33 per tillable acre below the 1990 returns. Prices received for all the major livestock commodities were below the previous year's while feed costs remained stable. Besides the lower farm earnings on average, earnings varied substantially between different geographic areas of the state.

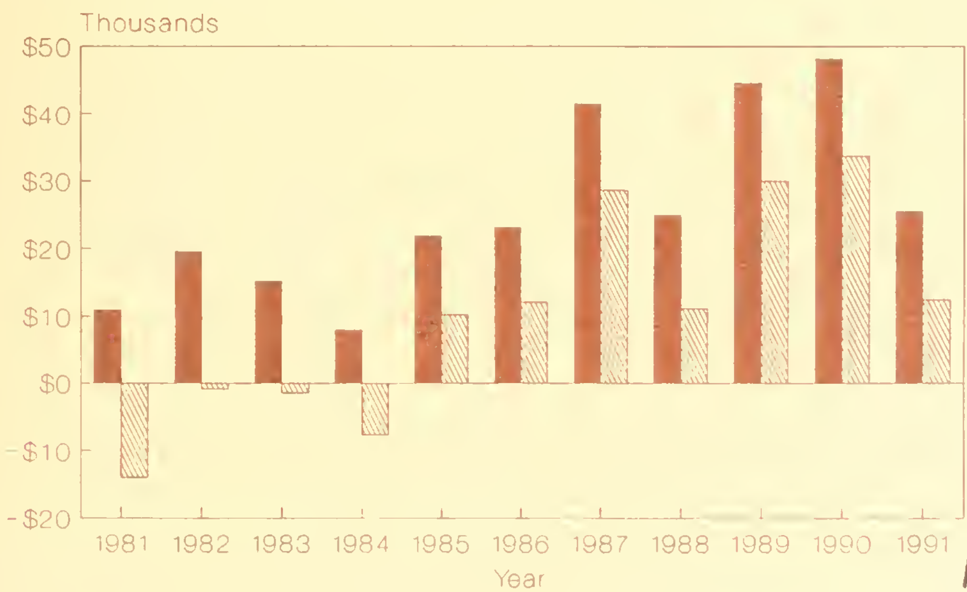

Figure 1. Operator's share of net farm income and labor and management income, 1981 to 1991.

Earnings in a few areas were quite satisfactory while other areas of the state suffered severe financial losses. This variability was tied directly to varying rainfall amounts and resulting differences in crop yields.

Records kept by 3,739 farmers enrolled in the Illinois Farm Business Farm Management Association (FBFM) record-keeping program have been used to estimate changes in net worth from 1988 to 1991. On a cost basis, without considering inflation or deflation of capital asset values, the change was calculated by adding net farm and net nonfarm income and subtracting family living expenses and income and Social Security taxes (Table 1). Using this procedure, the net worth of the average Illinois farm operator increased by $166 in 1988, $17,884 in 1989, and $19,440 in 1990; net worth decreased by $5,881 in 1991.

The change in net worth on a balance sheet based on fair market value would be affected negatively if it included the change in land values in 1987. Land values have increased since 1988, positively affecting the change in net worth. Net worth changes would vary greatly among farms and areas in the state depending on the level of farm and nonfarm income and the amount of family living expenditures.

Net farm income is the accrued value of the operator's share of farm production less total operating expenses, including the amount of interest paid and depreciation, plus gain or loss on machinery or buildings sold. When added to net nonfarm income, this is the income available to pay for family living expenses and income and Social Security taxes. This is also the source of income used to pay the principal on intermediate and long term debt and to invest into savings. Estimates used in Table 1 for net nonfarm income and withdrawals for living expenses and taxes were based on a sample of 408 Illinois farm families. Most of these farms were located in central Illinois. These families identified all sources of farm and nonfarm funds and the uses of these funds for precise expenditures. These expenditures were then adjusted downward by 10 percent to reflect the larger-than-average farms in central Illinois.

Capital Debt Repayment Capacity

The average amount available to each farm operator for repayment of capital debt was estimated at $17,236 in 1988, $33,406 in 1989, $35,424 in 1990, and $9,292 in 1991 (Table 1). These were the funds estimated to be available for capital purchases and payment of principal on intermediate and

Table 1. Estimated Change in Net Worth and Capital Debt Repayment of Capacity for 3,739 Illinois Farm Operators

	All Illinois counties			
	1988	1989	1990	1991
Net farm income	$24,503	$44,156	$48,059	$25,294
+ Net nonfarm income[a]	9,654	10,502	12,624	12,226
- Family living expenses[b]	26,858	29,538	32,743	33,208
- Income and Social Security taxes[b]	7,133	7,236	8,500	10,193
Change in net worth	$ 166	$17,884	$19,440	($5,881)
+ Depreciation	17,070	15,522	15,984	15,173
Funds available for capital debt repayment	$17,236	$33,406	$35,424	$ 9,292
Capital purchases	$15,292	$18,440	$24,406	$21,757
Cash interest paid	$13,611	$14,775	$15,507	$15,617

[a]Actual amounts identified from a sample of 408 farms for 1988, 1989, 1990, and 1991.
[b]Actual amounts identified from a sample of 408 farms for 1988, 1989, 1990, and 1991 reduced by 10 percent.

long-term debt. The table shows actual dollar commitments per farm that were made for capital purchases of machinery, equipment, or buildings. Results from the last four years indicate that except for 1991, the amount spent for capital purchases has been less than the funds available for capital debt repayment. While total capital purchases in 1991 were 11 percent below 1990, expenditures per acre were at their second highest level since 1983, averaging $32 per tillable acre. Limited capital replacement during the mid-1980s combined with better farm earnings in 1989 and 1990 resulted in increased capital purchases. However, lower farm incomes in 1991 will limit machinery replacement in the near term for many farm operators.

The records show that funds available for debt repayment varied considerably between geographic areas in the state and even in the same geographic area depending upon rainfall amounts. Estimated changes in net worth in 1991 were negative for most areas of the state. Estimated changes in net worth ranged from a $23,500 increase in the west central Illinois area to a $27,000 decrease in northern Illinois. Eastern Illinois and the southern tip of Illinois also experienced substantial decreases in net worth.

Interest Paid as a Percentage of Gross Farm Returns

The amount of interest paid by an FBFM operator averaged 9.9 percent of gross farm returns in 1991, compared to 8.8 percent in 1990, 8.9 percent in 1989, and 9.8 percent in 1988. The main reason this figure increased in 1991 was lower gross farm returns. The average cash interest paid in 1991 was $15,617, $110 higher than in 1990. This was the third year in a row that the amount of interest paid was more than the previous year, although the increase was insignificant. Approximately 3 percent of the farm operators had negative incomes in 1991 (Figure 2). These 3 percent were paying over 35 percent of their gross farm returns for interest. Fifty-nine percent of the farm operators in 1991 were paying less than 10 percent of their gross farm returns for interest. The average income for these 59 percent was $10,935 higher than the average income for all the farm operators. The percent of farm operators paying less than 10 percent of their gross farm returns for interest was at the lowest level since 1986, when 54 percent of farm operators were in this group.

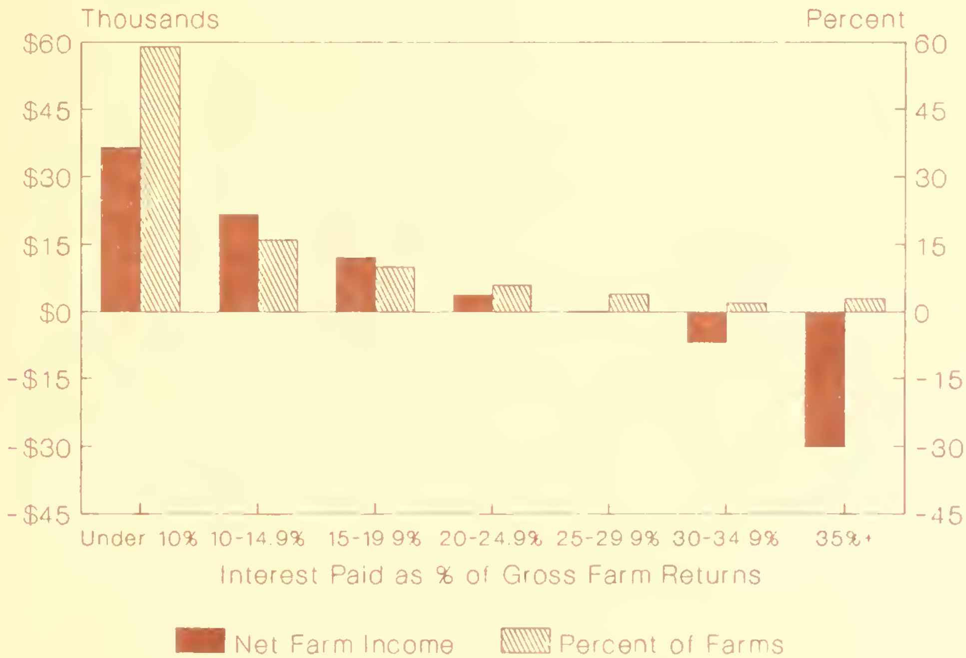

Figure 2. Operator's average net farm income and percent of farms by interest paid as a percent of gross farm returns, 1991.

Costs and Returns from Crops

Corn and soybeans are crops that make important contributions to net farm incomes and the financial status of Illinois farm operators. Figures 3 and 4 show the cost and return per bushel of both corn and soybeans produced each year from 1982 to 1991 on 600 central Illinois grain farms with high-quality soils and no livestock. Note that the total cost of growing a bushel of corn has exceeded the average annual Illinois corn price in five of the ten years since 1982. The difference between the total of all costs and the total nonland cost line is the charge for the use of land. The deficits indicate that total returns for the year were below total economic costs, which includes a fair return to capital and unpaid operator labor. Income support provided by the government farm program has offset part of the deficits.

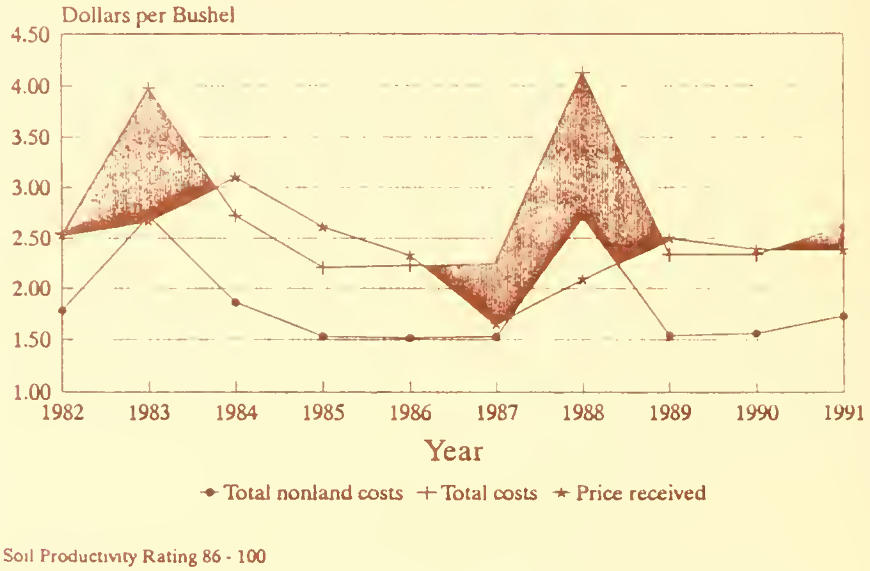

Figure 3. Cost and return per bushel of corn on central Illinois grain farms, 1982 to 1991.

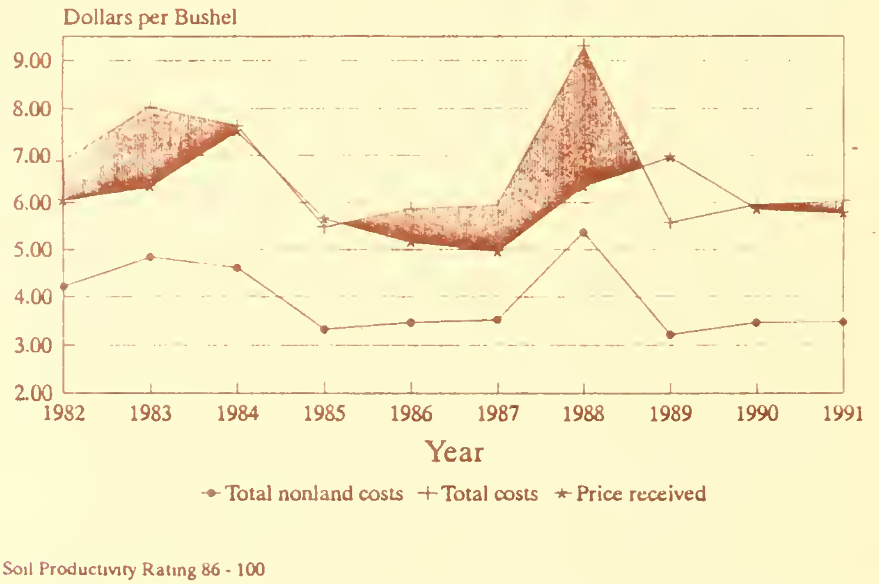

Figure 4. Cost and return per bushel of soybeans on central Illinois grain farms, 1982 to 1991.

Variable cost, part of the nonland costs, reflects the total of cash expenditures for fertilizer, pesticides, seed, and drying, which are normally shared according to the terms of the lease on rented farms, plus the cost of fuel, and machinery hire and repair. Other nonland costs include labor, depreciation, interest, building upkeep, and overhead.

Total costs per acre of corn produced in 1991 decreased 1 percent from these costs in 1990. However, lower yields on these sample farms caused the cost of production in 1991 to increase to $2.63 per bushel compared to $2.34 in 1990. Using the past four-year average corn yield of 127 bushels per acre, costs per bushel of corn produced are now averaging about $1.08 for the variable cost, $1.78 for the total nonland cost, and $2.71 for the total cost.

Figure 4 shows the cost and return per bushel of soybeans produced on these same farms from 1982 to 1991. The total cost has exceeded returns each year since 1982 with the exception of 1985 and 1989. While total costs per acre declined by 1 percent, lower yields caused the cost per bushel to increase by 8 cents in 1991. Using the past four-year average yield of 43 bushels per acre, costs per bushel are now averaging about $1.93 for the variable cost, $3.72 for the total nonland cost, and $6.47 for the total cost.

Costs and Returns from Livestock

Livestock has also been important to the current financial status of farm operators. The cost and return per hundredweight of pork produced annually from 1982 to 1991 on an average sample of 95 farrow-to-finish enterprises with an average of 442 litters per year is shown in Figure 5. Returns to farrow-to-finish hog producers were considerably lower in 1991 compared to 1990. Returns in 1991 were also lower than the last five-year average. This was mainly due to a 10 percent decrease in the average price received for market hogs. Feed costs remained relatively stable during the year.

The average returns above the cost of feed and purchased animals from the annual records of about 1,500 individual livestock enterprises from 1987 to 1991 are shown in Table 2. This is the return available to pay for labor, machinery, equipment and building repairs, depreciation, livestock expense, taxes, overhead, and an interest charge on all capital used. There is no economic profit until these costs are covered. The last five-year average returns from the farrow-to-finish hog and dairy enterprise covered total costs. The feeder-pig finishing enterprise operated near a break-even margin. Based on the estimates of nonfeed costs in Table 2, the average returns above all costs from 1987 to 1991 for farrow-to-finish hogs were $20.13 (returns above feed and purchased animals) minus $16.95 (nonfeed costs), or a positive $3.18 per hundred pounds produced. For feeder-pig finishing enterprises, total costs per hundredweight exceeded returns by an average of 16 cents. Feeder cattle showed returns per hundredweight that were $4.22 short of covering all costs; dairy returns averaged $192 per cow above all costs, whereas beef cow herds were $22 short per cow.

Returns to all major livestock enterprises in 1991 were below the 1990 returns, some considerably. Prices received for all major livestock commodities were below the previous year's prices. Feed costs, the largest single expense item in raising livestock, remained stable. Market hog prices were 10 percent lower, milk prices were 15 percent lower, and slaughter cattle prices were 5 percent lower. Only the farrow-to-finish hog enterprise realized a positive return to management, which meant returns were more than total economic costs. Returns to the livestock industry declined last year as producers increased production in response to profitable margins which the industry has experienced in recent years. While returns were lower for livestock producers, increases in the size of the enterprises and improvements in efficiencies continues to be evident. Future returns will depend to a great extent on when and to what degree producers respond to lower margins by reducing production and continued improvement in production efficiencies.

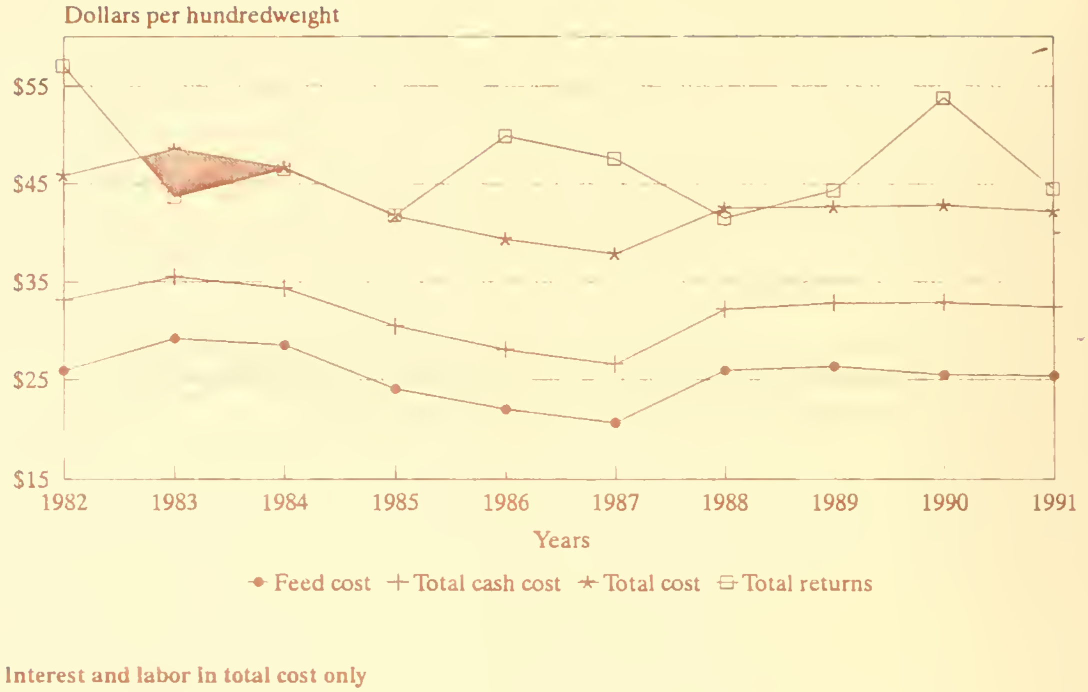

Figure 5. Cost and return per 100 pounds of pork on farms with over 250 litters, 1982 to 1991.

Table 2. Returns above Cost of Feed and Purchased Animals to Livestock Enterprise Units from 1987 to 1991

Year	Farrow-to-finish hogs	Feeder-pig finishing	Feeder cattle	Dairy cattle	Beef herd[a]
	------*per hundredweight*-------			-----*per cow*-----	
1987	$25.09	$13.28	$30.47	$1,301	$212
1988	14.01	6.63	20.56	1,116	196
1989	16.71	10.20	18.66	1,334	170
1990	27.15	15.79	25.74	1,471	230
1991	17.67	6.80	3.97	1,064	106
5-year average	**$20.13**	**$10.54**	**$19.88**	**$1,257**	**$183**
Nonfeed costs, 1987-1991					
Direct cash	$ 6.35[c]	$ 4.20[b]	$12.80[c]	$ 420[c]	$ 30[b]
Other costs	10.60[c]	6.50[b]	11.30[c]	645[c]	175[b]
Total	**$16.95**	**$10.70**	**$24.10**	**$1,065**	**$205**

[a]The feed cost for beef herds includes up to $60 of hay equivalent from salvage roughage.
[b]Includes veterinary costs, utilities, fuel, equipment and building repair costs, depreciation, labor, and other nonfeed costs, including interest on feeder livestock, from Table 6, *Farm Management Manuals*, 1986 to 1990.
[c]Estimates of annual nonfeed costs are based on enterprise cost studies of operative units from 1987 to 1990.

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FARM ECONOMICS Facts & Opinions

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Issue 92-9 June 1992

The Illinois Economy in 1991: The Recession Spreads Downstate

Farm Economics Facts and Opinions 92-3 reported that through 1990 the national recession had not been seen in downstate Illinois. We have now analyzed 1991 retail sales tax data, released in April by the Illinois Department of Revenue. These data are available for 1,290 Illinois towns and cities and provide a detailed picture of local economies throughout the state.

Compared to 1990, local economies worsened everywhere in the state in 1991. "Real" retail expenditures fell 6.4 percent in the state overall, following a real decline of 2.2 percent the previous year (Table 1). ("Real" dollars are dollar figures adjusted for inflation. All values in this report are in constant 1991 dollars.) The largest decline was in central Illinois (-7.8 percent), closely followed by northern Illinois (-6.4 percent). Real sales fell 3.9 percent in southern Illinois. For the earlier period (1989-1990), real sales rose in central and southern Illinois (1.0 percent and 0.3 percent) and fell by -3.0 percent in northern Illinois.

Clearly, the recession has had uneven effects across the state (Table 2). Hardest hit were Cook County (-7.7 percent) and downstate metropolitan counties (-7.0 percent).

Table 1. Retail Expenditures by Region of the State

Region of state	Number of towns	Total retail expenditures in 1990 (millions of 1991 \$)	Total retail expenditures in 1991 (millions of 1991 \$)	Percent change, 1990-1991
Illinois	1,290	82,977.0	77,689.2	-6.4
North	555	64,356.2	60,225.2	-6.4
Central	373	11,151.2	10,286.2	-7.8
South	362	7,469.6	7,177.7	-3.9

NOTE: Regions of the state are based on Illinois Cooperative Extension Service (CES) regions. "North" is defined as CES regions 1, 2, and 3, ranging from Jo Daviess and Lake counties (north) to Henderson and Kankakee counties (south). "Central" is defined as CES regions 4 and 5, ranging from Hancock and Iroquois counties (north) to Pike and Clark counties (south). "South" is defined as CES regions 6 and 7, ranging from Calhoun and Crawford counties (north) to Alexander and Massac counties (south).

Table 2. Retail Expenditures by County Type or Economic Base

County type or economic base	Number of towns	Total retail expenditures in 1990 (millions of 1991 $)	Total retail expenditures in 1991 (millions of 1991 $)	Percent change, 1990-1991
Cook	128	34,744.9	37,658.5	-7.7
Collar	173	18,259.6	19,090.0	-4.3
Downstate metropolitan	259	14,291.6	15,364.2	-7.0
Rural manufacturing	225	5,339.3	5,601.4	-4.7
Rural agricultural	240	1,585.0	1,689.1	-6.2
Rural diversified	265	3,468.9	3,573.9	-2.9

NOTE: "Collar counties" include DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will. "Downstate metropolitan" counties include all other metropolitan counties in Illinois as defined by the federal government (18 counties). "Rural agricultural" counties include all rural counties in which employment in farming and agricultural services represented 15 percent or more of total county employment in 1986 (29 counties). "Rural manufacturing" counties include all rural counties in which manufacturing employment represented 15 percent or more of total county employment in 1986 (21 counties). "Rural diversified" counties include all other counties, several of which have employment shares of 15 percent or more in both agriculture and manufacturing (26 counties).

Rural diversified counties experienced the smallest decline (-2.9 percent). In comparison, for the earlier period (1989-1990), the collar counties around Chicago felt the recession more sharply than elsewhere, and it appears that the worst of the recession is now behind them. Although they also feel the recession, rural diversified counties continue to outperform other areas. Their relatively small decline of -2.9 percent this period, following positive growth of 1.8 percent the previous period, led all county groups for the past two periods.

The largest declines were in small towns (5,000 people or less) and in large towns and cities (20,000 people or more) (Table 3). Relatively small declines are seen for large towns and small cities with populations between 5,000 and 20,000, continuing a trend from the previous period.

Inflation-adjusted sales declined in all seven of the commodity categories (Table 4). Sales of nondurable items (for example, groceries, restaurant meals, and general merchandise) fell less than durable items (for example, automobiles, construction material, and household furniture). It is noteworthy that except for sales associated with big-ticket items (such as automobiles and construction materials for new homes and businesses), sales in large towns and small cities (roughly 2,500 to 20,000 people) actually grew despite the recession, suggesting that these places are taking market share from very small towns and large cities. There was also evidence of this in the earlier period (1989-1990).

Conclusions

Several conclusions are apparent from these recent sales data.

1. The national recession, which began in the third quarter of 1990 and afflicted Chicago and its collar counties first, has spread throughout the state. During calendar year 1991, the recession's impacts were largest in Chicago and in downstate metropolitan areas, while its grip on the collar counties is loosening. Southern Illinois and rural diversified counties continue to experience smaller declines than other parts of the state.

2. Inflation-adjusted sales have now declined for three consecutive years in Illinois (-0.9

Table 3. Retail Expenditures by Town Size

Town size	Number of towns	Total retail expenditures in 1990 (millions of 1991 $)	Total retail expenditures in 1991 (millions of 1991 $)	Percent change, 1990-1991	Median percent change, 1990-1991
0-250	119	25.5	22.0	-13.9	-2.7
251-500	217	207.6	186.1	-10.3	-9.2
501-2,500	513	4,193.2	3,904.3	-6.9	-5.5
2,501-5,000	125	3,786.9	3,608.7	-4.7	-4.3
5,001-10,000	105	8,106.7	7,876.0	-2.8	-4.6
10,001-15,000	54	7,217.7	7,179.1	-0.5	-2.9
15,001-20,000	41	6,186.3	5,955.3	-3.7	-3.4
20,001-25,000	23	4,885.3	4,532.1	-7.2	-4.6
25,001-50,000	51	16,969.8	15,505.9	-8.6	-5.3
50,001-100,000	21	12,632.6	11,935.7	-5.5	-5.7
100,001+	4	18,361.8	16,578.7	-9.7	-8.4

NOTE: "Median percent change" refers to the 50th percentile growth rate for each size category. Fifty percent of the towns have growth rates lower than this, and 50 percent have higher growth rates.

Table 4. Retail Expenditures by Town Size and Business Category

Town size	General merchandise 1991	General merchandise % Δ[a]	Food 1991	Food % Δ	Drinking and eating places 1991	Drinking and eating places % Δ	Apparel 1991	Apparel % Δ
0-250	0.9	-26.8	0.7	-32.1	4.6	-1.4	0.01	-31.5
251-500	6.0	-14.5	9.2	-8.4	23.2	-6.0	0.4	64.0
501-2,500	367.5	-2.4	215.1	-3.3	312.9	-5.3	116.7	-6.5
2,501-5,000	293.8	2.1	222.5	-1.1	339.4	0.9	71.7	-20.5
5,001-10,000	1,135.0	-0.8	330.6	-2.1	707.0	-1.6	507.0	31.4
10,001-15,000	1,339.8	8.9	344.5	6.7	624.5	0.3	395.4	-6.2
15,001-20,000	733.8	3.1	298.7	0.0	532.6	-0.7	194.1	-0.5
20,001-25,000	528.1	-4.6	213.5	2.3	435.6	-3.5	241.8	-1.0
25,001-50,000	2,245.2	-5.5	716.5	-5.3	1,379.8	-4.5	706.4	-16.4
50,001-100,000	1,819.1	6.0	469.1	-0.1	1,048.9	-0.9	654.3	-8.5
100,001+	1,929.8	-6.1	721.6	-0.7	2,515.8	-4.1	1,115.3	-5.1
Illinois	10,427.4	-0.5	3,568.1	-1.0	7,959.8	-2.8	4,014.2	-4.6

Table 4 continued

Town size	Household and furniture 1991	Household and furniture % Δ	Lumber, building, and hardware 1991	Lumber, building, and hardware % Δ	Automotive and filling stations 1991	Automotive and filling stations % Δ
0-250	0.9	71.7	0.7	-25.7	8.5	-3.1
251-500	4.1	1.1	21.8	-23.5	51.0	-10.5
501-2,500	128.7	-13.0	419.5	-4.4	1,048.4	-6.9
2,501-5,000	94.4	-0.7	322.0	-7.8	1,037.3	-7.8
5,001-10,000	295.2	-7.0	638.5	-8.4	1,666.2	-8.5
10,001-15,000	284.2	13.6	468.2	-7.5	1,520.0	-7.2
15,001-20,000	238.0	-0.6	521.1	-10.1	1,456.3	-2.5
20,001-25,000	197.3	21.4	372.3	-12.7	1,072.5	-6.9
25,001-50,000	744.4	-7.2	1,171.0	-9.3	3,617.2	-9.9
50,001-100,000	561.9	-5.5	910.2	-9.1	2,701.6	-9.7
100,001+	814.3	-6.2	1,067.5	-12.3	2,275.6	-11.6
Illinois	3,373.7	-3.4	5,944.6	-9.6	16,547.0	-8.6

NOTE: Dollars are in millions of 1991 dollars.
[a]%Δ means "percent change."

percent from 1988-89, -2.2 percent from 1989-90, and -6.4 percent from 1990-91). The spring 1992 forecast of the Illinois Econometric Model maintained at the University of Illinois is for mild growth in real personal income in 1992 (3.8 percent) and real gross state product (2.5 percent) and vigorous growth in real retail sales (7.1 percent). If this turnabout occurs, the most rapid gains will probably occur in Chicago, its collar counties, and in downstate metropolitan areas—places hit the hardest by the recession but also likely to rebound the most in a recovery. Rural areas, which were last to feel the recession, may rebound the least in the current expansion, which seems to be under way.

3. Local governments throughout Illinois should see modest improvement in their sales tax base and a firming in their property tax base as the recovery proceeds. Stability in property tax revenue is particularly important to counties and townships, which receive on average about 30 and 65 percent, respectively, of their revenues from this source. Municipalities have a more diversified revenue base and will benefit directly from improvements in both real estate and retail sales. All local jurisdictions also gain indirectly as the state's economy prospers because the state will have more resources to transfer to local governments. A growing economy will be good news to local governments for another reason. The governor has proposed eliminating the Income Tax Surcharge Local Government Distributive Fund one year earlier than its current expiration date of June 1993. Stronger local economies can help make up for this current source of local revenue.

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FARM ECONOMICS
Facts & Opinions

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Issue 92-10 *July 1992*

Farm and Family Living Income and Expenditures, 1988 through 1991

In 1991, the total noncapital living expenses of 456 farm families enrolled in the Illinois Farm Business Farm Management Association (FBFM) averaged $32,480—or $2,707 a month for each family (Table 1). This average was 1.2 percent higher than 1990 and 13.9 percent higher than in 1989. Another $4,418 was used to buy capital items such as the personal share of the family automobile, furniture, and household equipment. Thus, the grand total for living expenses averaged $36,898 for 1991 compared with $36,381 for 1990, or a $517 increase per family. The average amount spent per family for capital items was $127 more, while noncapital expenses increased $390 per family. The sample farms, which were mainly grain farms, were located primarily in central Illinois in a 15-county area bounded by Jacksonville, Peoria, Champaign, and Mattoon.

Figure 1 illustrates the annual capital and noncapital family living expenditures and income and Social Security tax payments for 1982 through 1991. Total family living expenses increased approximately 5 percent annually during this period. Income and Social Security tax payments increased the last four years (1988-1991) due to improved farm earnings, elimination of investment tax credit, and an increase in the Social Security tax rate.

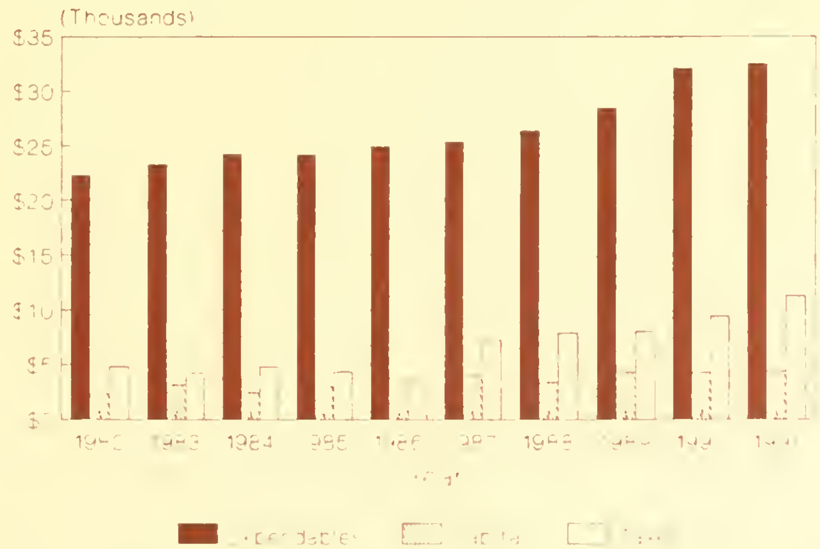

Figure 1. Noncapital and capital family living expenditures and income tax and Social Security payments, 1982 to 1991.

Table 1. Average Sources and Uses of Funds Over a Four-Year Period and by Noncapital Living Expenses for Selected Illinois Farms

	All records, average per farm				Family of 3 to 5, 1991[a]	
	1991	1990	1989	1988	High-third	Low-third
Number of farms in sample	456	408	402	365	95	95
Tillable acres farmed	731	719	709	661	892	563
Acres owned	131	120	119	116	120	90
Farm assets, January 1[b]	$381,588	$358,394	$335,756	$321,422	$435,352	$286,245
Farm assets, December 31[b]	383,283	384,363	355,420	303,897	437,488	287,947
Liabilities, January 1	198,764	183,161	175,939	187,670	259,314	152,298
Liabilities, December 31	202,708	203,168	182,841	175,131	268,503	153,650
Net farm income	30,596	50,825	45,047	17,438	37,177	22,457
Source of dollars						
Net nonfarm income	$ 12,226	$ 12,624	$ 10,502	$ 9,654	$ 15,504	$ 11,537
Money borrowed	118,446	116,122	90,394	91,872	179,209	85,461
Farm receipts	177,832	180,737	156,717	163,138	233,982	149,306
Uses of dollars						
Interest paid	$ 15,550	$ 15,070	$ 13,850	$ 12,907	$ 21,438	$ 11,779
Cash operating expenses	111,037	112,943	97,737	101,802	150,975	95,382
Capital farm purchases	22,829	27,834	18,299	13,237	27,770	21,015
Payments on principal	113,510	98,101	85,797	104,689	168,916	83,651
Income and Social Security taxes	11,326	9,444	8,040	7,926	13,213	8,344
Net new savings and investment	-2,646	9,710	1,070	-5,739	-4,269	-2,457
Living expenses						
Contributions	$ 1,271	$ 1,260	$ 1,198	$ 1,049	$ 2,148	$ 670
Medical	4,675	4,381	3,853	3,505	6,128	3,424
Insurance, life and disability	2,268	2,227	2,149	1,997	3,334	1,365
Expendables	24,266	24,222	21,299	19,888	34,470	17,824
Total noncapital expense	(32,480)	(32,090)	(28,499)	(26,439)	(46,080)	(23,283)
Capital	4,418	4,291	4,321	3,403	4,572	5,307
Total living expenses	$36,898	$ 36,381	$ 32,820	$ 29,842	$50,652	$28,590
Percentage change, total noncapital living expenses	1.2	12.6	7.8	3.9		

[a]Records were sorted into high- and low-third categories according to total noncapital living expenses.
[b]Modified cost basis except bare land values were held at current values between January 1 and December 31.

How these families use their funds depends somewhat on the levels of net income from farm and nonfarm sources and the priority of the expenditure. In this sample, the 1991 net farm income decreased ($20,229 per farm) due to lower grain yields and lower livestock returns. Net nonfarm income also decreased by $398 from 1990.

The amount of interest expense paid by each farm operator increased from $15,070 in 1990 to $15,550 in 1991. Interest paid as a percentage of farm receipts increased from 8.3 percent in 1990 to 8.7 percent in 1991. The highest that this percentage has been during the decade of the 1980s was in 1983 when it was 15.3 percent. The lowest that the percentage has been was in 1988 when it was 7.9 percent. As a percentage of cash operating expenses, the interest paid increased from 11.8 percent in 1990 to 12.3 percent in 1991. Cash farm receipts were $243 per tillable acre, a decrease of $8 per tillable acre. They were at their highest level in 1987 when they were $265 per tillable acre. Cash operating expenses, including interest, decreased $5 per tillable acre. Machinery and building purchases decreased from $27,834 in 1990 to $22,829 in 1991, but were still at their second highest level for farms in this study since 1979.

Debt-to-Asset Ratio Remains Constant

The sample of farms showed an average debt of 53 cents for each $1 of farm assets as of December 31, 1991; machinery was valued at cost, less depreciation. The debt for each $1 of assets was also 53 cents on December 31, 1990. Both the value of farm assets and the amount of debt remained essentially the same as the year before. This debt-to-asset ratio would be lower if machinery were valued at a current market value. Including nonfarm assets would also lower the ratio.

The farms in this sample were 47 acres larger than the average for the 7,500 farms in the FBFM record-keeping program. Crop yields averaged about 5 percent above those reported by the Illinois Crop Reporting Service. Operator's farm income from this sample of farms was higher than the average of all Illinois record-keeping farms. The average operator's net farm income of all Illinois record-keeping farms was $25,294 or $5,302 less than the average net farm income for this sample. The average living expenditures for farms in this sample are estimated to be 15 to 20 percent above the average of all Illinois farm operators having more than $40,000 gross sales per farm because the average net farm income for this sample is usually higher than the average for all farms.

In 1991, the average operator of these 456 farms was 45 years old. The family averaged 3.6 members, with the oldest dependent child averaging 10 years. The average operator farmed 731 tillable acres; 131 acres, or 18 percent of this land, was owned. The operators kept records so that all sources of funds, both farm and nonfarm, balanced with all uses of funds in a complete monthly cash-flow accounting system.

In the table, the averages per farm for total family living expenses are divided into five categories for 1988 through 1991. The "expendables" category includes cash spent for food, operating expenses, clothing, personal items, recreation, entertainment, education, and transportation. This category also includes selected itemized deductions such as the personal share of real estate taxes. Cash spent for capital improvements exceeding $250 is not included. The use of a rented house on an estimated 40 to 50 percent of the farms in this sample is not included because these data cover only cash outlays.

Noncapital living expenditures per tillable acre decreased $1 to $44 per tillable acre. During the last decade, noncapital living expenditures have varied from $37 to $45 per tillable acre. The excess on nonfarm taxable income over nonfarm business expense was $12,226 in 1991 or 33 percent of the total living expense; in 1990, the excess was 35 percent. It includes dividends on stocks, interest on savings and money-market funds, income from other nonfarm investments, and income from off-farm employment performed by family members. Interest earned and left in savings accounts not included in the cash flow is not reflected in the nonfarm income.

Assets, Liabilities Decrease Slightly

The value of farm assets and the amount of liabilities for this sample of 456 farms decreased slightly when compared to a year earlier. The value of farm assets on December 31, 1991, was $1,080 less than a year earlier. The decrease reflects lower values in grain and livestock inventories. Land values would have increased slightly. At the same time, liabilities also decreased by $460. These farm operators borrowed $4,936 more than they made in principal payments for the year. In 1990, the amount borrowed exceeded principal payments by $18,021. The $22,829, or $31 per tillable acre, spent on capital purchases for machinery and equipment was the second highest since 1982.

Although at lower levels compared to earlier years in the 1980s, interest payments continue to be one of the highest farm expense items. The amount of interest paid in 1991 increased compared to 1990. Interest includes that amount paid on operating, intermediate, and real estate debt. Interest paid increased from 12 percent of total farm operating expense in 1979 to 21 percent in 1983 and dropped to 12 percent in 1991. The $15,550 interest payment in 1991 was 8.7 percent of total cash farm receipts, up from 8.3 percent in 1990.

High-Third/Low-Third Comparison

The records from farm families with three to five persons were sorted into two categories, the high third and the low third, according to their noncapital living expenses. The total living expenses for the high-third group averaged $50,652, compared with $28,590 for the low-third group. Figure 2 illustrates total living expenses for these two groups for 1985 through 1991. The high-third group farmed 329 more acres than the other group and owned 13 percent of the land farmed; the low-third group owned 16 percent of the land farmed. The larger farms in the first group had more income for living expenses and to pay income tax. Net farm plus nonfarm income was $52,681 for the high-third group compared with $33,994 for the low-third group. The average age of operators in the high-third group was 42, and the number of family members was 4.2; this compared with 39 years of age and 3.9 family members for the other group. Subtracting total living expenses and income and Social Security taxes paid from the total of net farm and nonfarm income results in a negative balance of $11,184 for the high-third group and a negative $2,940 for the low-third group. Figure 3 illustrates this balance for these two groups for 1985 through 1991. It is interesting to note that although the low-third group had less income than the high-third group, they had more funds left after subtracting their family living and tax expenditures.

Farm operations continue to grow in size. As these operations expand, more funds are flowing in and out of the businesses. More lenders are requiring cash-flow projections and continual monitoring of these projections. It is, therefore, important that more farmers learn how to balance and monitor their cash flow each month. Computer program assistance is now becoming available in more service centers such as some FBFM Association district offices. These centers are prepared to offer services to help farmers project monthly cash flow on computer printouts so that they can compare projections with their actual results. Increased use of microcomputers for farm accounting purposes should also assist more farm operators to account for all funds.

For farm operators with low equity or very high debt-to-asset ratios, this type of accounting is essential. These operators should account for all of their sources and uses of funds to assist them in making sound financial management decisions.

The data summarized in this process may also serve as a guide in budgeting allowances for family living expenses. For families in this sample, the family living expenses averaged $50 for each tillable acre farmed. If the net nonfarm income of $17 per tillable acre is used for living expenses, $33 per tillable acre would have to be generated from the farm business to meet family living requirements. Since 1983, this amount has varied only $4 per tillable acre, ranging from $29 to $33. Each family must determine how much each acre of crop or each litter of hogs should contribute to their family living expenses. This amount, when added to production costs and other obligations, can help to determine break-even prices needed for products sold.

Figure 2. Total family living expenditures for families with three to five members sorted into high-third and low-third groups according to noncapital living expenses, 1985 through 1991.

Figure 3. Average of net farm and nonfarm income less total family living expenses and income and Social Security taxes paid, sorted into high-third and low-third groups according to noncapital living expenses, 1985 through 1991.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 92-11 *August 1992*

Certified Farmland Assessed Values Up 10 Percent for 1993

After more than four years of steadily declining certified assessed values for farmland, values increased in 1992 and 1993. In fact, 1993 certified values, issued in May 1992 to county assessing officers, are up 10 percent for all soil productivity indexes. The farm economy performed poorly in the early and mid-1980s with weak commodity prices and high interest rates; this resulted in significant downward pressure on certified assessed values for farmland through 1990. These values are issued by the Illinois Department of Revenue each spring to county assessing officials, and assessing officials use them to determine the taxable value of farms on the following January 1.

Recovery in commodity prices and lower interest rates has put upward pressure on certified values for 1992 and 1993. The 1993 values were limited in their increase to 10 percent by the 10 percent limit law. This law, passed in 1986, restricts the change in certified values to 10 percent from one year to the next. Its purpose is to partially insulate the tax bases of rural schools and other local governments from a poorly performing farm sector and thus lower farmland assessments. It also insulates farm property taxpayers from significant assessment increases caused by substantial changes in key economic variables such as interest rates and commodity prices.

1993 Certified Assessed Values by Soil Productivity Index

The per-acre certified assessed value of cropland that assessing officers will use to determine the 1993 assessed value of farmland throughout Illinois is shown in Table 1. For comparison, 1992 certified values are also presented. The 1993 assessed values of farms will be the base for taxes paid by farm owners in 1994. The index ranges from 60 to 130, and the 1993 certified values range from $8.88 to $322.86 per acre. The assessor applies the appropriate certified value in calculating the taxable value of farmland in each farm tax parcel after determining the soil index for the parcel and the use of the land in farming. The farmland assessment is added to assessments for buildings, building sites, home, and home site to get the total taxable value on each farm parcel.

The certified values for 1993 in Table 1 are 110 percent of the values certified in 1992 because the assessed values calculated with the income capitalization formula required by the Illinois Farmland Assessment Law were more than 110 percent of the 1992 values. The 10 percent limit law required the certification of values that increased by no more than 10 percent from the 1992 certified values.

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Table 1. 1992 and 1993 Certified Farmland Equalized Assessed Values (EAV) by Soil Productivity Index

Productivity index (average management)[a]	1992 certified EAV[c]	1993 certified EAV[b]	Productivity index (average management)[a]	1992 certified EAV[b]	1993 certified EAV[b]
	--------*dollars per acre*--------			-------*dollars per acre*--------	
60	8.07	8.88	96	102.89	113.18
61	8.73	9.60	97	107.82	118.60
62	9.41	10.35	98	112.84	124.12
63	10.05	11.06	99	117.93	129.72
64	10.71	11.78	100	123.05	135.36
65	11.36	12.50	101	128.27	141.10
66	12.03	13.23	102	133.55	146.90
67	12.68	13.95	103	138.84	152.72
68	13.34	14.67	104	144.22	158.64
69	13.99	15.39	105	149.68	164.65
70	14.65	16.12	106	155.60	171.16
71	15.30	16.83	107	162.17	178.39
72	18.10	19.91	108	168.76	185.64
73	20.89	22.98	109	175.34	192.87
74	23.67	26.04	110	181.92	200.11
75	26.46	29.11	111	188.50	207.35
76	29.24	32.16	112	195.07	214.58
77	32.03	25.23	113	201.64	221.80
78	34.80	38.28	114	208.22	229.04
79	37.59	41.35	115	214.79	236.27
80	40.38	44.42	116	221.38	243.52
81	43.16	37.38	117	227.95	250.74
82	45.95	50.55	118	234.52	257.97
83	48.72	53.59	119	241.11	265.22
84	51.52	56.67	120	246.10	270.71
85	54.31	59.74	121	250.67	275.74
86	57.08	62.79	122	255.30	280.83
87	60.98	67.08	123	259.96	285.96
88	65.41	71.95	124	264.65	291.12
89	69.83	76.81	125	269.34	296.27
90	74.39	81.83	126	274.09	301.50
91	79.01	86.91	127	278.91	306.80
92	83.64	92.00	128	283.75	312.12
93	88.36	97.20	129	288.60	317.46
94	93.12	102.43	130	293.51	322.86
95	97.98	107.79			

Source: Illinois Department of Revenue, Certification Memos, 1992 and 1993.

[a]Average management productivity index is the average of the basic and the high-level management indexes as reported in *Soil Productivity in Illinois*, Illinois Cooperative Extension Service Circular 1156, 1978.

[b]110 percent of 1991 certified values for productivity index figures 60 to 119; actual 1992 calculated values for productivity index figures 120 to 130.

[c]110 percent of 1992 certified values for productivity index figures 60 to 130.

The income capitalization formula required by the Illinois Farmland Assessment Law is simply represented by:

$$\frac{\text{Gross income per acre less nonland production costs per acre}}{\text{Average Federal Land Bank mortgage interest rate}}$$

The formula uses five-year-average data to calculate the per-acre assessed value for cropland. There is a two-year lag between the assessment year and the last year of data used in the calculations. For example, the 1993 calculations, which had to be completed before May 1991, used data averaged over 1987-1991. Lags in data used for the assessment of all types of property are very common. Because income and costs vary by soil quality, a separate calculation is done for each soil productivity index.

Why Have Certified Assessed Values Increased in 1992 and 1993?

A shift in the underlying fundamental economic conditions in farming since the mid- to late 1980s has put upward pressure on the certified values. Commodity prices are one of the major factors influencing the calculations of certified values. The relationship between commodity prices and calculated certified assessed values on farmland is direct; higher prices result in higher calculated values, and lower prices result in lower calculated values.

The commodity prices for 1976 through 1991 are presented in Table 2. The five-year-average prices are calculated from these prices. For example, the average price for the 1993 assessment calculation is the average price from 1987 through 1991. For corn, this is $2.26; for soybeans, it is $6.16.

Figures 1 and 2 present the five-year-average prices used in the assessment calculations for 1981 through 1993. Figure 1 shows average corn prices, and Figure 2 shows average soybean prices. The decline in average prices that began in 1986 put downward pressure on the calculated assessed values. With the leveling of average prices in assessment year 1991 and upward price movement since then, calculated assessed values have been pressured up by stronger five-year-average commodity prices.

There will probably continue to be upward pressure on assessment calculations from higher five-year-average commodity prices, particularly for corn. In the 1994 calculations, the 1987 corn price of $1.61 will be removed from the five-year average and the 1992 price will take its place. Because the 1992 corn price will be at least in the $2.40 range, the five-year-average corn price for the 1994 assessment calculations will be greater than $2.26, the 1993 five-year-average price.

Another major determinant of certified assessed values is the five-year-average mortgage interest rate of the Federal Land Bank. This rate is used as the capitalization factor in the formula. There is an inverse relationship between the capitalization factor and the calculated assessed values; a higher interest rate results in lower calculated assessed values and a lower interest rate results in higher calculated values. The five-year-average interest rates by assessment year are presented in Figure 3. Beginning with assessment year 1981, the interest rates increased steadily through assessment year 1988. Higher interest rates combined with weak commodity prices put substantial downward pressure on the calculated assessed values. However, with the 1989 assessment year, lower interest rates began to put upward pressure on the values. In assessment years 1992 and 1993, stronger five-year-average commodity prices combined with lower five-year-average mortgage interest rates from the Federal Land Bank to put significant upward pressure on calculated assessed values for farmland. The upward pressure was great enough to trigger the 10 percent limit law, restricting the increase in certified values from 1992 to 1993 to 10 percent.

Farmland Assessments for the Rest of the 1990s

With relatively stronger commodity prices and lower interest rates, we can expect increases in calculated assessed values for farmland for most of the 1990s. Remember, the values in Table 1 are for assessment year 1993. The 10 percent limit law restricted the increase in certified assessed values in both 1992 and

Table 2. Illinois Commodity Price Summary, Calendar Years 1976 to 1991

Year	Corn	Soybeans	Wheat	Oats
	------------------------(*dollars per bu*)[a]--------------------------------			
1976	2.54	5.65	2.98	1.44
1977	2.07	6.84	2.19	1.32
1978	2.12	6.32	2.93	1.28
1979	2.43	6.96	3.75	1.43
1980	2.78	6.90	4.02	1.58
1981	2.99	7.03	3.79	1.99
1982	2.43	5.88	3.12	1.92
1983	3.04	6.86	3.36	1.95
1984	3.13	7.14	3.34	1.81
1985	2.53	5.53	3.17	1.70
1986	2.00	5.09	2.80	1.26
1987	1.61	5.16	2.69	1.67
1988	2.32	7.28	3.41	2.30
1989	2.49	6.74	3.99	1.92
1990	2.46	5.92	3.09	1.29
1991	2.42	5.72	2.72	1.20

SOURCE: Illinois Crop Reporting Service.
[a]Price used in farmland assessment computations.

1993. Thus, all of the increases from those two years that are related to higher prices and lower interest rates have yet to be completely reflected in assessed values certified to local assessing officials. And the likely continued upward pressure on calculated values from higher five-year-average commodity prices and lower five-year-average mortgage interest rates from the Federal Land Bank suggests that the 10 percent limit law will restrict the upward movement in certified values for two to three years at least. This suggests upward pressure on certified assessed values for farmland for much of the rest of the 1990s as the stronger underlying fundamental economic conditions are incorporated into the certified values.

Figure 4 traces the certified and calculated assessed values for a soil with an index of 120 from assessment year 1981 through assessment year 1993, with some projection through assessment year 1995. Between 1981 and 1986, the certified value was equal to the calculated value. The 1986 limit law changed this. Beginning in 1987, the certified value was greater than the calculated value through 1990 assessments as the 10 percent limit law restricted the decline from one year to the next to 10 percent. For this soil, the calculated and certified values were identical or very close in 1991 and 1992. Because of stronger commodity prices and lower interest rates, the calculated value in 1993 is above the certified value. The 10 percent limit law is working on the up side, limiting the increase from 1992 to 1993 to 10 percent.

Projections for assessment years 1994 and 1995 show the certified value below the calculated value in each year. Even with stable five-year-average prices and interest rates, this would be expected as the increases from prior assessment years are accommodated in these certified values. With continued upward pressure on five-year-average commodity prices and downward pressure on the five-year-average mortgage interest rate from the Federal Land Bank, the calculated value trend line is not likely to cross the certified value trend line until close to assessment year 2000. Current declines in interest rates will affect the assessment calculations for assessment year 1994 through assessment year 1998. Of course, very dramatic changes in the underlying economic fundamentals could drastically change this projection. However, with the fundamentals remaining near current trends, we can expect upward movement in certified assessed values on farmland at or close to 10 percent per year for the next several assessment years.

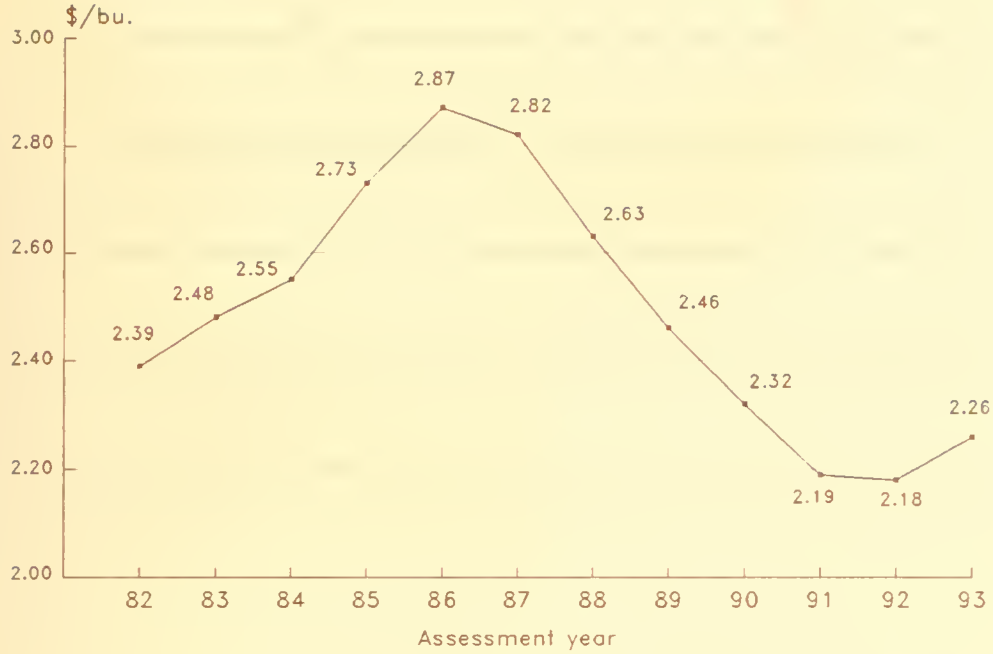

Figure 1. Average corn price for assessments.

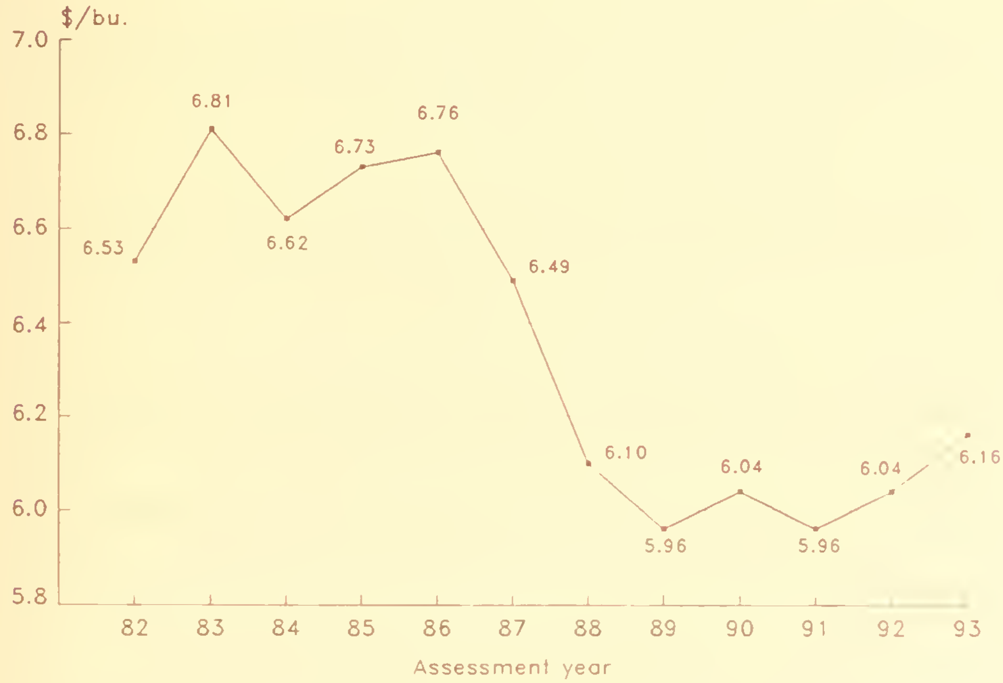

Figure 2. Average soybean price for assessments.

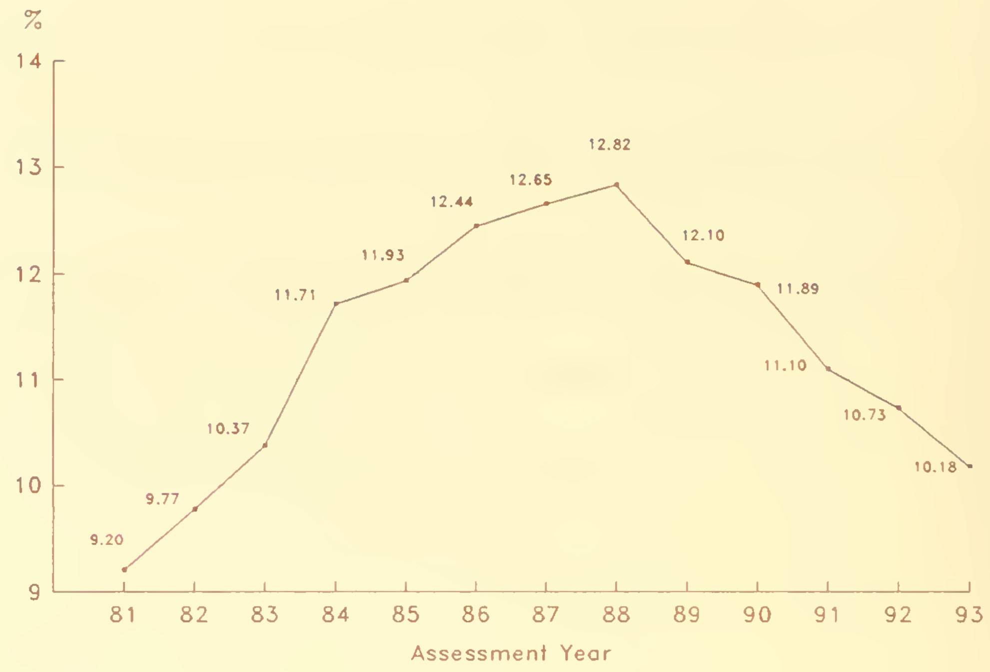

Figure 3. Farmland assessment capitalization rates.

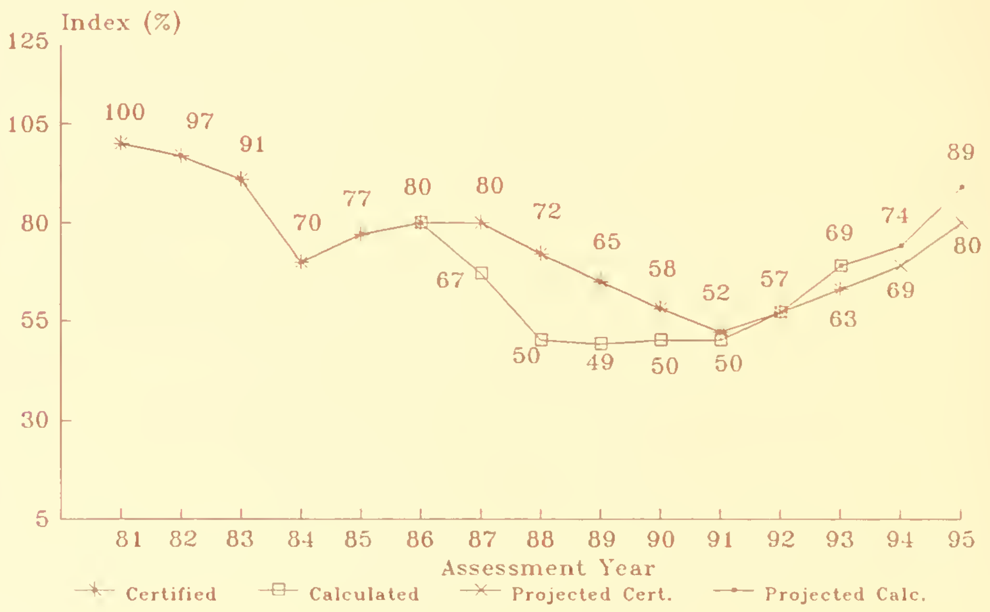

Figure 4. Index of certified and calculated assessed values for soils with a productivity index of 120, 1981 to 1993, with projections for 1994 and 1995.

What About Future Property Tax Bills?

Higher certified assessed values on farmland will be welcomed by rural school boards, townships, and county governments and will be disturbing to farmland property taxpayers. A 10 percent increase in certified values for 1993 does not have to translate into a comparable increase in tax bills payable in 1994. Only the budgeting process of schools and other local governments will determine the impact of stronger farmland assessed valuations on farm property tax bills. History suggests, however, that property tax bills are very sticky downward when assessments are declining and very robust upwards when assessments are increasing. Taxpayers should get involved in the budgeting process of taxing bodies in the upcoming budget years to temper the impact of higher farmland assessed values on farm property tax bills.

For several years, the 10 percent limit law held certified assessed values on farmland above the level prescribed by underlying economic conditions. Now, particularly with declining interest rates, the 10 percent limit law will hold certified assessed values below where they would otherwise be. Just as it took several years for the farm recession of the 1980s to be worked into the Illinois farm property tax base, it will take several years for the stronger fundamentals to be accommodated into higher farmland assessed values. The assessed value on farmland, in a general sense, is reflecting the underlying aggregate economic conditions of Illinois agriculture as the 1981 Farmland Assessment Law intended. These assessments are tempered by the 10 percent limit law, which provides some stability for both taxing districts and farmland property taxpayers.

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FARM ECONOMICS
Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

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1991 Farm Property Taxes Show Little Change

Property tax reform remains high on the agenda of state officials, members of the General Assembly, local school officials, and property taxpayers. While there is agreement that reform is important and necessary to balance the public finance system in Illinois, there is little consensus on exactly what steps should be taken. Most agree reliance on the property tax to finance local schools is too heavy. But lowering this reliance will require significant increases in state tax rates (that is, the income and/or sales tax rates). There is and will likely continue to be significant political resistance to increasing state taxes. However, the eventual likelihood of increased state taxes appears to be high so that tax reform can be dealt with seriously and the weak fiscal condition of Illinois state government can be addressed.

In property tax reform debates, information about the Illinois property tax and the state/local government finance system is very important. The average per-acre tax paid on Illinois grain farms is presented in Figures 1, 2, and 3. These figures provide an excellent historical view of farm property taxes in Illinois.

The average per-acre tax paid on Illinois grain farms was virtually the same in 1988, 1989, and 1990 ($14.98, $14.99, and $15.01, respectively). The average payment in 1991 was slightly lower at $14.44. The 1991 average per-acre tax is based on 1990 assessments and was used to finance local government spending in fiscal year 1992. Of course, property taxes are the outcome of multiplying the assessed valuation of property by the property tax rate. The tax is the residual budget-balancing revenue source for schools and other local governments. Thus, if assessed valuations on farmland decrease because of poor economic conditions in agriculture but spending by local schools and local governments increases because of teachers' salaries and other expenditures are higher but state school aid and other revenues do not change, the property tax rate will increase to cover the higher spending. If the rate is at the maximum allowed without a referendum, voters may be asked to authorize a rate hike.

It is widely recognized that the poor economic conditions in Illinois agriculture pushed farmland assessments down between assessment years 1987 and 1991. To experience the type of average per-acre property tax payments presented in Figure 1, there had to be significant pressure on the average farm property tax rate (outside of Cook County). By 1989 (the most recent year for which data are available), the average rate on farm property increased to 6.60 percent from 6.05 percent in 1987. This is an increase of about 9 percent. For the rest of the 1990s, per-acre property taxes on Illinois farms will reflect the interplay of higher certified farmland assessed values (as much as 10 percent per year for several years) and high farm property tax rates adopted when farmland assessments were sliding.

Per-Acre Taxes Across the State

Figure 1 shows per-acre property taxes for a sample of Illinois grain farms from 1976 to

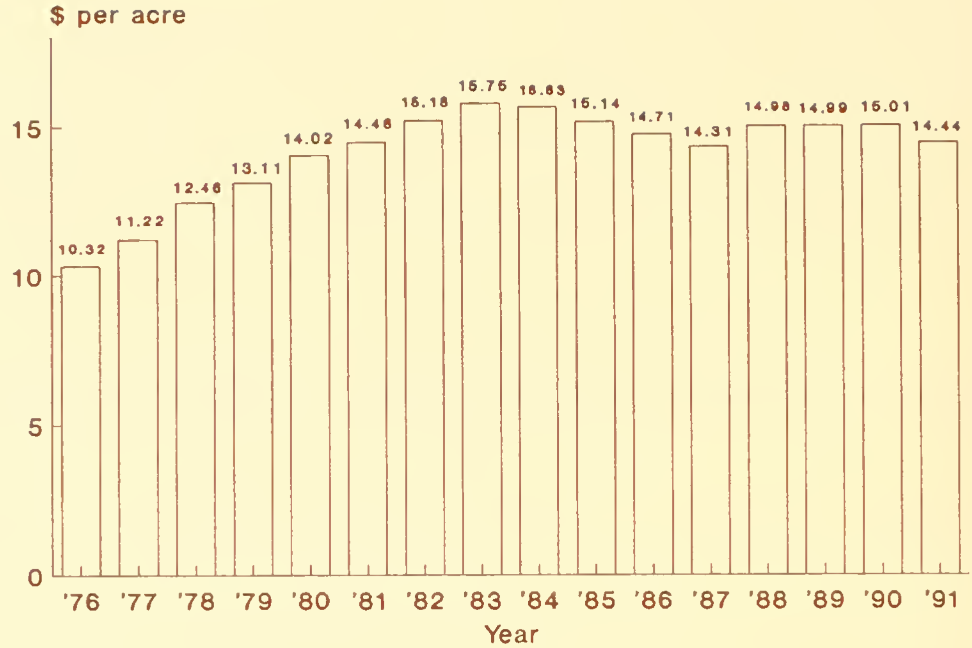

Figure 1. Per-acre property taxes on Illinois grain farms, 1976 to 1991.

1991. Data for the sample in the 68 northern and central Illinois counties and the 34 southern Illinois counties are also included in Figures 2 and 3. In 1991, the sample included 2,020 grain farms, totaling 1.71 million acres. In 1991, average per-acre taxes on southern Illinois grain farms were 52 percent of the state average. Average per-acre taxes on northern and central Illinois grain farms were 122 percent of the state average.

The historical difference in the level of per-acre property taxes in the two regions of Illinois reflects the less productive soils in southern Illinois compared to the other region of the state; this results in lower farmland assessed valuations. Generally, farm property tax rates are lower in southern Illinois as well. In 1991, these differences resulted in an average $17.66 per-acre tax in northern and central Illinois and a $7.57 per-acre average tax in southern Illinois.

Average 1991 per-acre taxes paid were somewhat lower in both regions of the state compared to 1990. This indicates that between 1989 and 1990 farm property tax rate increases were not large enough to fully offset the general decline in farmland assessments. Lower farm property tax payments put budget pressure on schools and other local governments serving rural Illinois.

Effective Tax Rates and Tax Payments

The effective property tax rate is the ratio of property taxes paid to the market value of farmland. It is one of the better methods for measuring the property tax burden on Illinois farms. High effective rates or increasing effective rates indicate a high property tax burden or an increasing burden, respectively. Effective rates for the last 16 years for Illinois and the northern and southern regions of the state are shown in Table 1. The effective rate in 1991 for Illinois was 0.89, down slightly from the 1990 rate of 0.94. The declining farm property tax burden, which began in 1988 and continued through 1991, is the result of strengthening market values on farmland and essentially flat property tax payments.

Recent drops in property tax burdens on farm property are consistent with the changes that occurred in the late 1970s. Between 1976 and 1982, the effective rate for Illinois declined 42 percent. Over this period, the market value of farmland, driven by extraordinary inflationary pressures, increased significantly faster than the property tax paid by farmland owners.

Table 1. Effective Property Tax Rates on Illinois Farms, 1976 to 1991

Tax year	Effective tax rate, percent[a] Northern Illinois	Southern Illinois	Illinois
1976	1.02	0.88	0.96
1977	0.93	0.75	0.86
1978	0.74	0.62	0.72
1979	0.72	0.59	0.68
1980	0.69	0.54	0.65
1981	0.60	0.49	0.56
1982	0.58	0.51	0.56
1983	0.66	0.56	0.64
1984	0.85	0.72	0.82
1985	0.99	0.84	0.95
1986	1.11	0.94	1.07
1987	1.31	0.92	1.20
1988	1.14	0.89	1.08
1989	1.02	0.82	0.97
1990	0.99	0.73	0.94
1991	0.94	0.71	0.89

[a]The effective tax rate is the ratio of property taxes to the market value of farmland, computed using only grain farms.

In 1983, the property tax burden on Illinois farms began to increase. The effective tax rate increased from 0.56 in 1982 to 1.20 in 1987, an increase of 114 percent. This increase was driven by significant decreases in farmland market values that were not accompanied by comparable changes in property taxes. In fact, from 1983 to 1987, period, average per-acre property tax payments declined while the tax burden, measured by the effective tax rate, increased.

Beginning in 1987, average per-acre property tax payments and the effective farm property tax rate have taken new directions. This shift in direction is best illustrated in Figure 4. The dotted line, representing the effective tax rate as an index, peaked in 1987 and has declined through 1991. The 1991 property tax burden on Illinois farms is similar to the burden in 1977 but with significant variation during this time period.

The solid line in Figure 4 is an index of average per-acre property tax payments by Illinois grain-farm owners. This line shows the steady increase in per-acre tax payments from 1976 through 1983, a decline from 1983 to 1987, an increase between 1987 and 1988, then a steady state for 1988 through 1991. The steady state was the result of ever-increasing property tax rates to offset the weak farmland assessments of 1986 through 1990, the basis for tax payments in 1987 through 1991.

Summary

Average per-acre property tax payments on Illinois grain farms were down slightly in 1991 compared to 1990. In nominal dollars, average per-acre payments in 1991 are close to the level paid in 1981. Changes in tax rates were not quite large enough to offset the weakened farmland assessments, causing per-acre payments in 1991 to drop slightly. Comparison of the effective tax rate and the average per-acre tax payment indicates a lower "tax burden" in 1991 accompanying the slight decrease in average per-acre payments. Strengthened assessed values in 1991, 1992, and 1993 with sideways movements in market values of farmland suggest the "tax burden" facing Illinois farm property owners will resume its upward trend of a decade ago for much of the remainder of this decade. Only property tax reform and the balancing of the Illinois tax system will reverse this prospect.

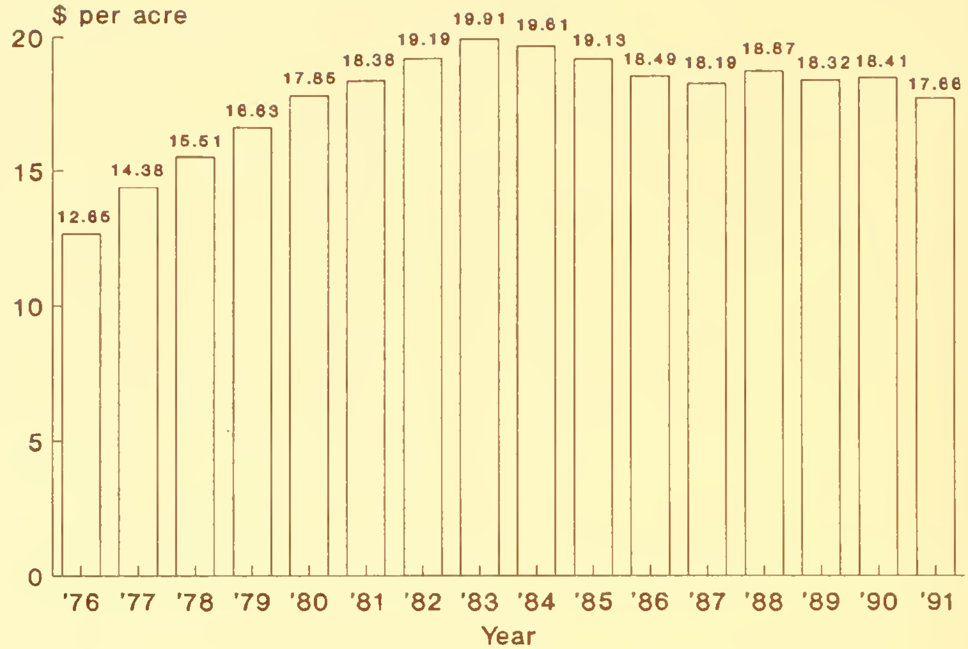

Figure 2. Per-acre property taxes on northern and central Illinois grain farms, 1976 to 1991.

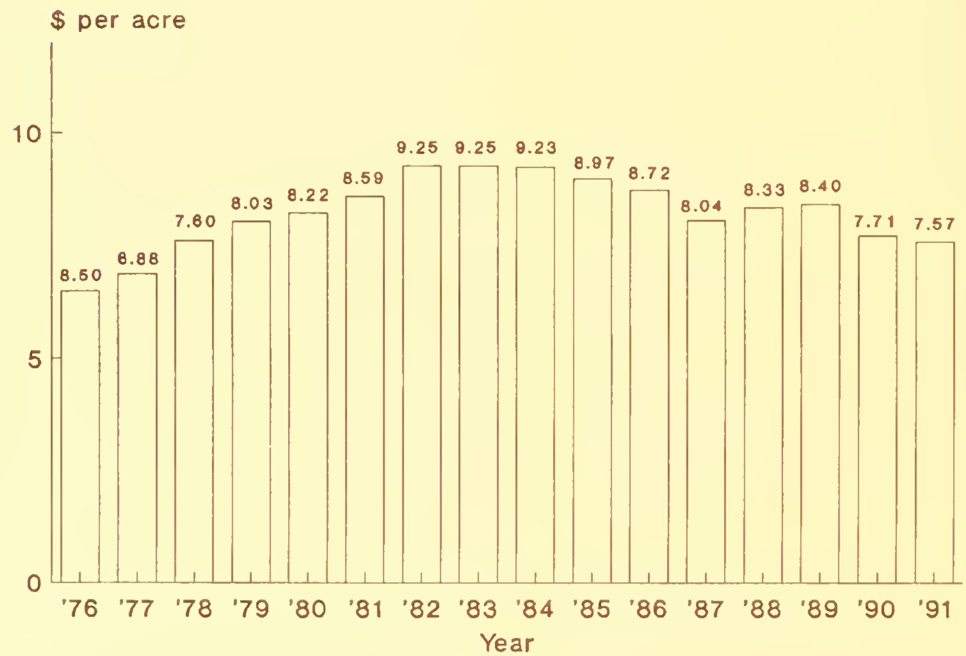

Figure 3. Per-acre property taxes on southern Illinois grain farms, 1976 to 1991.

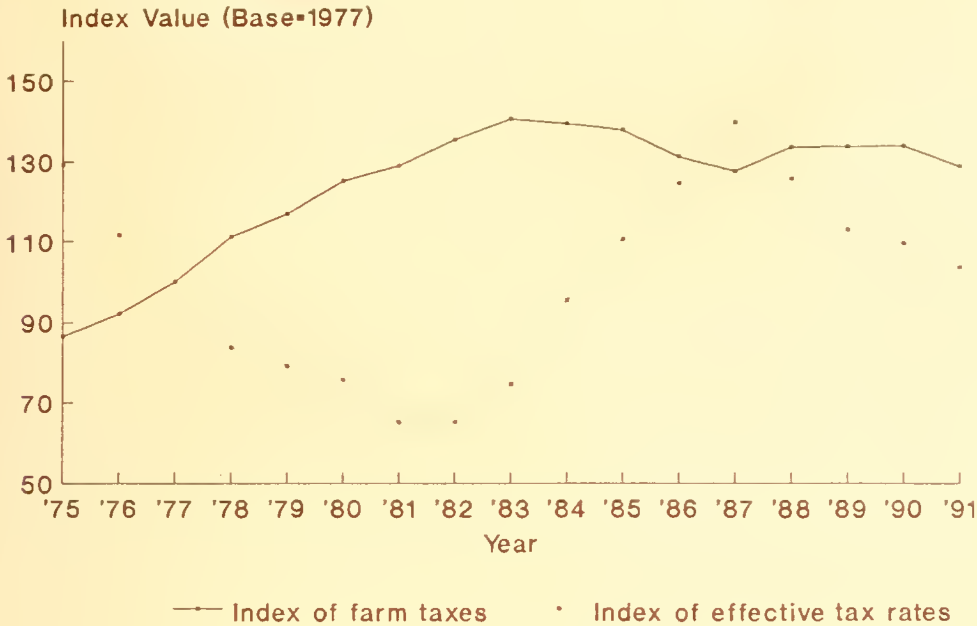

Figure 4. Index of per-acre farm property taxes and effective farm property tax rates, 1975 to 1991.

Understanding the dynamics of the Illinois farm property tax is not a trivial undertaking. Figure 4 clearly illustrates the important interaction between economic forces that drive farmland assessments and market values and spending by rural schools and other local governments, that drive property tax rates and determine farm property tax burdens in Illinois. As a strengthened farm economy is integrated into farmland assessments, per-acre property tax payments will increase unless there are corresponding offsets in property tax rates. Lower property tax rates are highly unlikely.

Increased property tax burdens will intensify pressures from the agricultural sector for property tax reform. The demands for reform will likely be manifested in ever louder calls for lower dependence on the property tax for financing rural schools and an increased financial role for state government. With the continued weak fiscal position of Illinois's state government, balancing the funding for local schools is out of the question without increases in one or both of the state's major revenue sources—the sales tax and the income tax. The November referendum on the constitutional amendment on school finance will intensify the debate on school finance and property tax reform in the months ahead.

Balancing the Illinois tax system presents a significant challenge to the members of the General Assembly and the governor of Illinois. However, understanding the complexities and dynamics of the farm property tax system will yield significant dividends as current tax policies are assessed and alternatives are considered. The task is a major one, but the benefits of a more balanced tax system will be significant and long-lasting.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 92-13 *October 1992*

Land Value Changes and Outlook

Land prices in the eastern Corn Belt (Ohio, Indiana, and Illinois) all increased from 1991 to 1992 from 2 percent to as much as 5 percent. USDA reported a 5 percent increase in Illinois from January 1991 to January 1992. Expectations for future increases in land prices, however, are in the process of being adjusted downward. A late spring survey of rural appraisers through their national organization indicated expected increases of 2 to 3 percent for the coming year; however, the most recent survey of the same group shows expectations of land price increases have declined to less than one percent for the coming year. This figure is below the rate of inflation, which is running 2 to 4 percent even in the midst of the general recession, so the real value of farmland is declining.

The major impetus for further increase in farmland value is now coming from lower returns on alternative capital investments and lower financing costs on farmland rather than any outlook for a significant increase in gross income, reduction in production costs, or urban development demand.

Alternative Asset Returns

With the stock market at an all-time high and lower corporate profits in many companies, the average return in stocks is now below the average return on farmland. The rates of return available to savers in bank savings accounts and bonds are also low. This makes farmland as good an investment as any other and better than some on a current return basis. Most farmland in recent years has been purchased for cash rather than leveraged. However, for the leveraged purchaser, mortgage rates are low, which makes a leveraged investment more attractive. Mortgage rates, however, are still about two times the return on land so that great care must be exercised by people trying to leverage land purchases with more than 40 or 50 percent credit.

Net Farm Income

Domestic demand for food increases at about the same rate as the population increases, which in this country is less than the normal increase in technology and yield increases in food production. We cannot expect higher revenues from the domestic market alone. Without a quick resolution of the Uruguay round of GATT (the General Agreement on Trade and Tariffs) negotiations or approval of NAFTA (North American Free Trade Agreement), we cannot expect much help on the export front and consequently no improvement in gross farm income.

Production Costs

Average farm production costs have declined and are continuing to decline slightly due to economics of size as farms get larger and there is a reduction in machinery and labor costs with the trend toward less tillage. But as time goes on, machinery replacement and other input cost increases will dampen out further decline on the cost side of the profit equation.

Nonfarm Demand for Land

Overexpansion in commercial building has generally brought a halt to further nonfarm demand for land near urban areas for the next few years. This has brought down the prices of land for development causing decline in nearby farmland prices as well. When land is purchased for development, the seller often gets the buyer to buy outlying farmland at a much lower cost per acre to trade for the development land so the seller can defer or avoid the capital gains tax that would otherwise be incurred. This transfers the demand for urban development to outlying farmland. For example, in northern Illinois where farmland prices were impacted by development in the Chicago area over the last ten years, prices of the better farms have declined by at least $300 per acre; in the rest of Illinois where urban development has had less effect, farmland prices are generally close to agricultural value.

Outlook for Land Values

About the only strong element affecting farmland prices on the up side is that alternative asset returns are no better and may in some cases be lower than on farmland, and interest rates are relatively low for buyers who need to leverage their purchase of farmland.

Most other demand factors seem to be weak or negative. Nevertheless, land prices in current dollars are likely to be relatively stable over the next two or three years. Land prices in current dollars will rise if there is general reinflation in this country. Reinflation is very likely because the federal government seems unable to limit or reduce deficit spending.

While in many localities land values are still strong, I expect the downward trend in real prices of land that began in 1980 (except for a short respite from 1988 to 1991) to continue for some time. I base this opinion mainly on information about the potential long-run increase in production of food and grain in the countries of Eastern Europe, once the "bread basket" of Europe, along with increased production in Argentina, the largest exporter of corn in the world prior to World War II. It is reported that Argentina has straightened out its politics, and their economy has become stable enough to peg their monetary exchange rate to the dollar. An area in Argentina west of Buenos Aires is comparable to our Midwest in soil productivity and climate. They do need substantial infrastructure, especially transportation and improved drainage, which we already have. Because of more efficient use of machinery and labor (forced onto farmers by low prices resulting from past export taxes) and little fertilizer or chemical costs, their present production costs of corn and soybeans are significantly less than ours. Therefore, Argentina could become a very strong competitor in the export market in the future.

Data on Land Values

We include two graphs (Figures 1 and 2) that show the real value of land (adjusted by the Consumer Price Index) and the real value of land rent. The real value of rent or return to land on a per-acre basis has been declining since 1973 and is now about the same as in the 1960s. Real land prices reached their peak in 1980 and declined to a low in 1987. There has been a small uptick in real land values since 1987 but they are now back on a downward trend. Real land prices are about the same as they were in the decade of the 1960s. Both of these figures are based on data on high-quality land gathered by University of Illinois researchers.

We also include the table of land price index numbers (Table 1), which is based on the annual estimate of land values by the USDA for the state of Illinois. This index is used by many of our readers for adjustment of net worth statements, by appraisers in their ordinary course of business, and by some landowners or farm managers and farm operators for adjustment of cash rents. The USDA stopped calculating the index based on the year 1967 some time ago. However, if you are still using the 1967 index, you can calculate that index by multiplying the index number based on 1977 by 3.53, which is the relationship of the two indexes in 1977.

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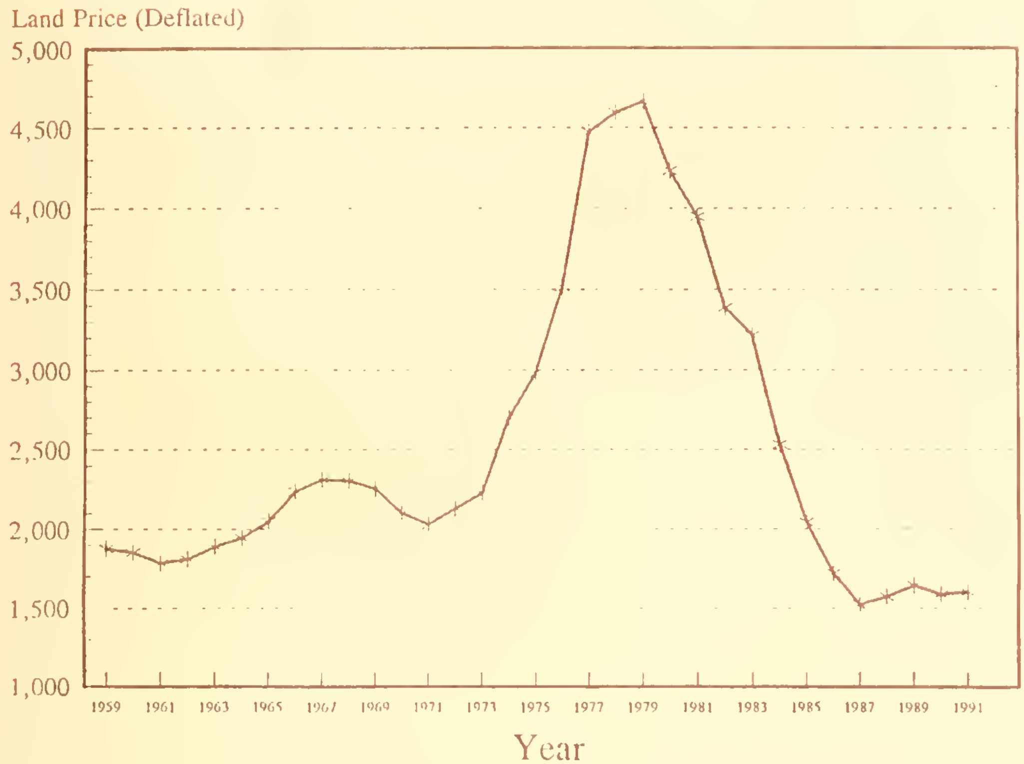

Figure 1. Real value of land, 1959 to 1991.

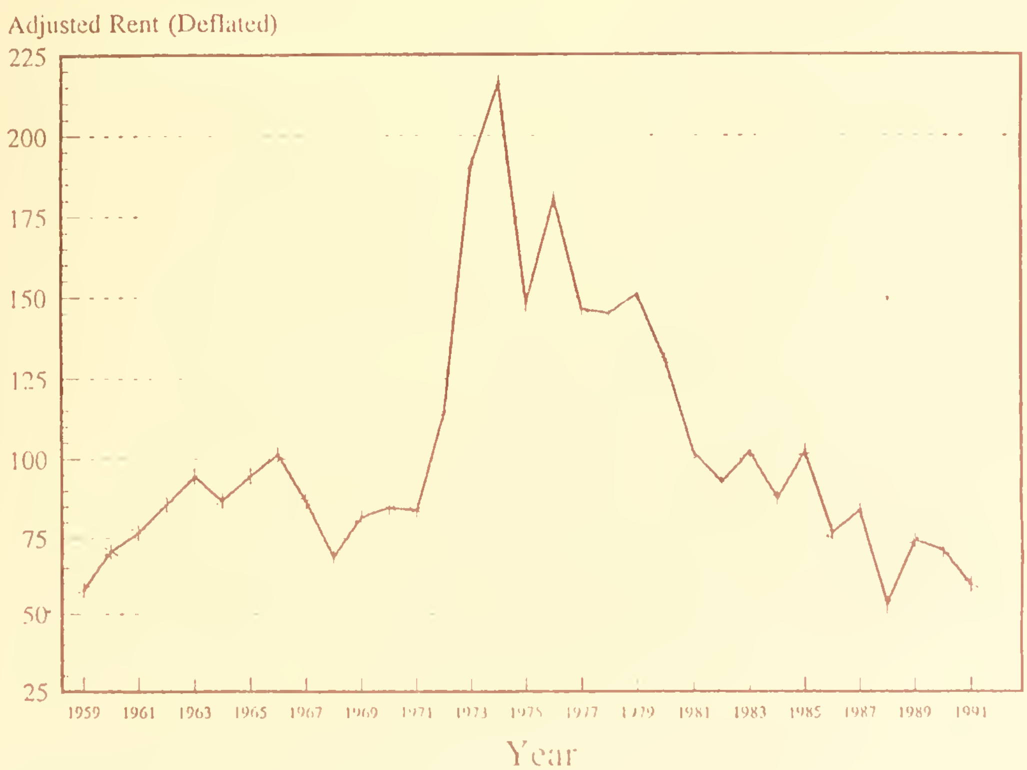

Figure 2. Real value of land rent, 1959 to 1991.

Table 1. Index Numbers of Illinois Farmland Values

Date	Index numbers (1967=100)[1]	Date	Index numbers (1967=100)	Date	Index numbers (1977=100)
1912	25	1951	50	1977	100
1913	26	1952	54	1978	111
1914	27	1953	55	1979	125
1915	27	1954	56	1980	135
		1955	57		
1916	27			1981	143
1917	29	1956	60	1982	131
1918	31	1957	65	1983	117
1919	34	1958	66	1984	115
1920	42	1959	71	1985	84
		1960	71		
1921	40			1986	73
1922	33	1961	69	1987	67
1923	32	1962	71	1988	72
1924	30	1963	75	1989	79
1925	30	1964	78	1990	81
		1965	84		
1926	29			1991	83
1927	26	1966	94	1992	87
1928	25	1967	100		
1929	25	1968	104		
1930	24	1969	109		
		1970	107		
1931	21				
1932	17	1971	108		
1933	14	1972	116		
1934	15	1973	129		
1935	16	1974	173		
		1975	209		
1936	17				
1937	18	1976	260		
1938	19	1977	353		
1939	19	1978	390		
1940	20	1979	441		
		1980	476		
1941	20				
1942	23				
1943	24				
1944	27				
1945	29				
1946	32				
1947	37				
1948	39				
1949	41				
1950	42				

[1]Index numbers are calculated from data taken from January 1 to April 1 of each year from USDA sources. Index numbers from 1912 to 1976 are based on 100 in the year 1967, and index numbers from 1977 on are based on 100 in the year 1977. This data is provided by Dr. John T. Scott, Jr., professor of land economics and farm management, University of Illinois at Urbana-Champaign.

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Issue 92-14 *December 1992*

Farm Programs for 1993 in Perspective

The 1990 farm bill required that the 1993 feed grain set-aside be announced by September 30 with final changes made no later than November 15. As a follow-up to the first announcement, the Secretary of Agriculture set the acreage reduction at 10 percent.

The established target prices and the price support and purchase rates for the 1993 crops of wheat, corn, sorghum, barley, and oats and the loan rate for rye are unchanged from 1992. They are as follows:

Commodity	Target price ($ per bushel)	Loan rate
Corn	$ 2.75	$ 1.72
Grain sorghum	2.61	1.63
Barley	2.36	1.40
Oats	1.45	0.88
Rye	none	1.46
Wheat	4.00	2.45

Producers who participate in the 1993 feed grain and wheat programs could receive up to 50 percent of their estimated deficiency payments during sign-up. Announcement of the estimated deficiency payments and the percent of advance payment is expected by the time sign-up begins.

Sign-up Period

Dates for sign-up for 1993 wheat and feed grain programs will be March 1 through April 30.

Calculating Deficiency Payments

Producers who sign up for the corn and wheat programs in 1993 will receive deficiency payments based on the difference between the target price and the higher of either the national weighted average market price for the first five months of the marketing year or the basic price support rate prior to any adjustment.

For 1994 and 1995, the calculation formula will change. In these years, calculations for the feed grain deficiency payment rate will shift to the difference between the target price and the lower of either the national weighted average market price for 12 months or the first 5 months of the marketing year price plus 7 cents per bushel, whichever is higher than the price support rate.

In 1994 and 1995, wheat deficiency payment calculations will shift to the difference between the target price and the lower of either a 12-month national weighted average marketing year price or the 5-month marketing year price plus 10 cents per bushel, whichever is higher than the basic price support rate.

These complex formulas for calculating deficiency payments can best be explained (or justified) as a means of reducing government outlays at this time of high budget deficits. It also illustrates how Congress has become involved in placing restrictions on the Secretary of Agriculture to set farm program provisions.

Payment Acreage

The amount of acreage eligible for payment was also changed in the 1990 Food, Agriculture, Conservation and Trade Act and Budget Reconciliation Act. Payment will be calculated on 85 percent of the base acreage less any acreage reduction in effect for that crop. Payments under the 0-92 and 50-92 provisions are also expected to remain the same in 1993.

Flexible Acreage

The same rules for flex acres in 1991 and 1992 are expected to continue in 1993. A producer may plant any program or nonprogram crop on the nonpayment portion of his base acreage, providing that crop is not specifically prohibited. For most Illinois corn or wheat producers, the most frequently planted alternative crop on flex acres will be soybeans. If the producer chooses, he may plant corn or wheat on the flex acreage, but he will not receive any deficiency payment for that portion of his crop planted on the nonpayment acreage.

Zero-92 acres may also be used as flex acres if minor oilseeds are planted. In Illinois, the most likely minor oilseed crops are canola and sunflowers.

The Farmer-Owned Reserve

The 1990 legislation also set guidelines for placing crops in the farmer-owned reserve. These requirements are based on the market price and the expected stocks-to-use ratio at the end of the marketing year.

The Secretary of Agriculture has announced that no 1992 crop wheat will be allowed into the farmer-owned reserve. The conditions required to allow entry into the farmer-owned reserve do not exist and conditions were not expected to change before December 15, the deadline for making the announcement.

The Secretary of Agriculture must allow entry when the average market price for wheat for the 90 days preceding the announcement is less than 120 percent of the wheat price support rate and the 1992 estimated wheat ending stocks-to-use ratio is more than 37.5 percent. If one condition is met, the Secretary may allow entry.

Factors that entered into the decision are: 120 percent of the wheat price support rate, $2.65 per bushel; 90-day wheat average market price, $3.17 per bushel; estimated 1992-93 wheat ending stocks, 523 million bushels; estimated 1992-93 wheat total use, 2,458 million bushels; and estimated 1992-93 wheat ending stocks-to-use ratio, 21.3 percent.

No announcement has been made regarding placement of 1992 corn into the farmer-owned reserve.

For 1993 crops, the decision about whether crops will be eligible will come after an assessment of supply, price, and stocks-to-use ratios has been made.

The 1993 Wheat Program

Since the first 1993 wheat program announcement was required by June 1, the Secretary of Agriculture announced a 0 percent acreage reduction. This figure was confirmed in a later announcement. To obtain price support loan and deficiency payments for the 1993 crop, producers on farms which have a wheat crop acreage base will not be required to devote any acreage on the farm to approved conservation use.

The 0 percent reduction was chosen from the 0 to 15 percent required by the 1990 law to "ensure sufficient supplies of U.S. wheat for domestic and export needs."

The 0 percent set-aside does not mean "fence-row to fence-row" planting as some media reports indicate. To qualify for program benefits, a producer must not overplant the base acreage for that farm. A sign-up agreement to obtain program benefits will be required as in past years, even though no acreage reduction below the base is required.

The zero acreage decision was justified on the basis that the U.S. has a commitment to maintain exports and a U.S. share in the world market. To be competitive, the Secretary also announced the U.S. intention of using the Export Enhancement Program and all other export promotion authorities available.

No paid land diversion will be implemented. Other provisions will be announced at a later date.

Oilseed Support Prices

The loan rate for 1993 soybeans will be $5.02 per bushel and $8.90 per hundredweight for minor oilseeds such as sunflower seed, flaxseed, canola, rapeseed, mustard seed, and safflower seed. These are the same as in 1992.

The GATT Trigger

The 1990 Act included certain provisions in the event that an agreement on agricultural trade reform is not achieved under the GATT (General Agreement on Tariffs and Trade) negotiations.

If the United States had not reached an agreement by June 30, 1992 (which they did not), then the Secretary was allowed to waive any minimum level of any acreage limitation program for any 1993-95 program crops. In addition, the Secretary must increase the export promotion programs by $1 billion during fiscal years 1994 and 1995 and establish marketing loan programs for the 1993-95 wheat and feed grain crops.

These measures would not be required if the President certified that the failure to enter into an agricultural trade agreement in the Uruguay round resulted, in part or in whole, because the "fast-track" procedures were not available with respect to legislation necessary to implement an agreement.

Also, if an agreement is not in effect by June 30, 1993, the Secretary must consider waiving all or part of the reductions in agricultural spending required, increasing the funds made available for export programs, and establishing a marketing loan program for the 1993-95 wheat and feed grain crops.

The GATT trigger provisions have been partly implemented for 1993 crops. If no agreement is reached by June 30, 1993, the Secretary has some additional obligations under the 1990 legislation.

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Issue 93-1 *January 1993*

Economic Multipliers for Metropolitan Areas in Illinois and Implications for the Proposed Rural Chicago Airport

Community economic developers are sometimes required to assess economic impacts. To cite some examples, in recent months Illinois developers have inquired into the economic impacts of:

- riverboat gambling in Moline
- a waste-to-energy facilty near Havana, Illinois
- casino gambling in Chicago
- ethanol production in Illinois
- a third Chicago airport

Consultants who provide the analysis for these and other studies sometimes use huge "multipliers" to inflate the economic impacts of a project. For example, consultants for a waste-to-energy facilty near Havana used a multiplier of 7, and the Illinois Department of Transportation used a multiplier of 5 for the proposed Lake Calumet airport. Maybe on Mars, but not in Illinois. *Farm Economics Facts & Opinions* 91-18 reported multipliers for rural Illinois counties. This issue presents multipliers for Illinois's metropolitan areas. The case of the proposed rural siting for a third Chicago airport illustrates how these multipliers are used to assist in evaluating local and state policies and projects in Illinois.

The multiplier refers to the indirect and induced spin-off effects of an economic impact. Suppose a new airport is built in a metropolitan area, creating 10,000 new jobs and generating $1 billion of net new income in the local economy. These are the direct impacts of the airport. But there are also indirect and induced effects. The airport uses machinery, trucks, fuel, financial services and other inputs from local industries to conduct its daily operations. Airline passengers also demand hotel and restaurant services and ground transportation in fulfilling their travel needs. These requirements represent the indirect, interindustry job and income effects from the airport. In addition, airport employees earn income, which they spend on groceries, housing, entertainment, and other consumer activities. Recipients of this income, in turn, buy groceries and other consumer goods. This spending generates jobs and income in local consumer industries and represents so-called induced effects in the metropolitan area. If the local employment multiplier in the transportation service industry equals 2, then each new job at the airport generates one additional job somewhere else in the urban economy from the indirect and induced effects.

There are many ways to calculate multipliers. Because multipliers are often used in project appraisal, it is useful to have bench marks. The following tables present bench-mark multipliers for Illinois's metropolitan areas. They are calculated using IMPLAN (IMpact PLANning), a 528-sector input-output model and data base developed by the Forest Service of the United States Department of Agriculture. Although no model is perfect, IMPLAN is superior to many other methods for calculating multipliers due to the detail in its data. Tables 1 through 3 present multipliers for 11 industries, which correspond to one-digit Standard Industrial Classification (SIC) code industries. Table 1

Table 1. Employment Multipliers for Illinois Metropolitan Areas

Sector	Cook County	Chicago CMSA[1]	Kankakee MSA	Rockford MSA	Davenport MSA[1]
Farm and Ag Services	1.23	1.30	1.40	1.44	1.52
Mining	1.59	1.63	1.38	1.37	1.39
Construction	1.39	1.42	1.34	1.37	1.43
Durables	1.44	1.46	1.37	1.51	1.44
Nondurables	1.65	1.71	1.58	1.62	1.66
TPU[2]	1.55	1.58	1.45	1.43	1.35
Wholesale	1.18	1.20	1.17	1.20	1.16
Retail	1.23	1.24	1.21	1.24	1.21
FIRE[2]	1.49	1.51	1.46	1.49	1.42
Services	1.34	1.35	1.30	1.32	1.28
Government and Other	1.17	1.18	1.17	1.19	1.16

Sector	Peoria MSA	Bloom.-Normal MSA	Champ.-Urbana MSA	Spring-field MSA	Decatur MSA	St. Louis MSA[1]
Farm and Ag Services	1.47	1.42	1.39	1.53	1.42	1.59
Mining	1.45	3.20	1.30	1.64	2.00	1.58
Construction	1.36	1.35	1.38	1.40	1.42	1.43
Durables	1.50	1.38	1.86	1.71	1.71	1.59
Nondurables	1.50	1.86	1.32	1.39	1.41	2.06
TPU[2]	1.40	1.47	1.32	1.36	1.43	1.58
Wholesale	1.18	1.16	1.15	1.19	1.23	1.24
Retail	1.23	1.20	1.20	1.24	1.27	1.29
FIRE[2]	1.49	1.55	1.44	1.47	1.51	1.54
Services	1.31	1.29	1.28	1.34	1.35	1.36
Government and Other	1.18	1.16	1.15	1.19	1.23	1.23

NOTES: All multipliers in Tables 1 through 3 are what IMPLAN calls "Type III" multipliers.
[1]The Chicago Consolidated Metropolitan Statistical Area (CMSA) is defined as Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will counties. The St. Louis Metropolitan Statistical Area (MSA) is defined as the Illinois portion only, and consists of Clinton, Jersey, Madison, and St. Clair counties. The Davenport MSA is defined as the Illinois portion only, consisting of Henry and Rock Island counties.
[2]TPU means "Transportation and Public Utilities"; FIRE means "Finance, Insurance, and Real Estate."

Table 2. Output Multipliers for Illinois Metropolitan Areas

Sector	Cook County	Chicago CMSA	Kankakee MSA	Rockford MSA	Davenport MSA
Farm and Ag Services	1.48	1.48	1.31	1.35	1.38
Mining	1.25	1.27	1.20	1.23	1.22
Construction	1.42	1.43	1.21	1.29	1.21
Durables	1.40	1.42	1.23	1.34	1.30
Nondurables	1.39	1.42	1.29	1.35	1.46
TPU	1.43	1.42	1.25	1.26	1.22
Wholesale	2.29	2.26	2.60	2.47	2.32
Retail	1.55	1.60	1.41	1.49	1.43
FIRE	1.29	1.29	1.18	1.24	1.23
Services	1.44	1.47	1.40	1.43	1.38
Government and Other	1.41	1.46	1.38	1.43	1.33

Sector	Peoria MSA	Bloom.-Normal MSA	Champ.-Urbana MSA	Spring-field MSA	Decatur MSA	St. Louis MSA
Farm and Ag Services	1.34	1.26	1.27	1.36	1.24	1.52
Mining	1.23	1.14	1.18	1.19	1.16	1.30
Construction	1.28	1.24	1.20	1.21	1.28	1.33
Durables	1.26	1.29	1.50	1.28	1.17	1.38
Nondurables	1.33	1.36	1.23	1.27	1.28	1.40
TPU	1.24	1.26	1.29	1.24	1.31	1.46
Wholesale	2.95	2.78	2.93	2.67	3.30	4.27
Retail	1.48	1.45	1.42	1.43	1.54	1.68
FIRE	1.24	1.34	1.19	1.29	1.26	1.26
Services	1.41	1.37	1.34	1.39	1.44	1.56
Government and Other	1.41	1.35	1.33	1.38	1.48	1.63

NOTES: See Table 1.

Table 3. Total Income Multipliers for Illinois Metropolitan Areas

Sector	Cook County	Chicago CMSA	Kankakee MSA	Rockford MSA	Davenport MSA
Farm and Ag Services	1.36	1.46	1.37	1.50	1.61
Mining	1.24	1.25	1.19	1.22	1.22
Construction	1.48	1.48	1.25	1.37	1.24
Durables	1.47	1.49	1.32	1.43	1.37
Nondurables	1.57	1.62	1.39	1.44	1.63
TPU	1.40	1.41	1.28	1.28	1.22
Wholesale	2.14	2.11	2.53	2.40	2.26
Retail	1.51	1.56	1.42	1.50	1.42
FIRE	1.25	1.25	1.15	1.21	1.21
Services	1.35	1.37	1.36	1.38	1.34
Government and Other	1.21	1.23	1.20	1.23	1.18

Sector	Peoria MSA	Bloom.-Normal MSA	Champ.-Urbana MSA	Spring-field MSA	Decatur MSA	St. Louis MSA
Farm and Ag Services	1.45	1.29	1.32	1.46	1.30	1.59
Mining	1.23	1.12	1.18	1.20	1.17	1.28
Construction	1.35	1.29	1.24	1.28	1.36	1.33
Durables	1.41	1.34	1.92	1.53	1.46	1.48
Nondurables	1.45	1.61	1.31	1.37	1.35	2.01
TPU	1.23	1.27	1.27	1.21	1.29	1.40
Wholesale	2.90	2.53	2.88	2.70	3.17	3.82
Retail	1.49	1.41	1.44	1.47	1.53	1.60
FIRE	1.22	1.37	1.17	1.29	1.24	1.21
Services	1.37	1.30	1.31	1.37	1.40	1.45
Government and Other	1.23	1.17	1.18	1.23	1.26	1.31

NOTES: See Table 1.

presents the employment multipliers, Table 2 gives the output multipliers, and Table 3 shows total income multipliers.

Several points are worth noting about these tables:

1. In general, the multipliers are small and, in most cases, less than 2. (Note: The output and total income multipliers for "wholesale trade" as represented in these tables seem too high and may be attributable to a programming error in Micro IMPLAN version 89-03.)

2. Multipliers tend to be a little higher in the eight-county Chicago Consolidated Metropolitan Statistical Area (CMSA), the Illinois portion of the St. Louis Metropolitan Statistical Area (MSA), and Cook County than in other metropolitan areas. These three areas constitute larger economies and have fewer import leakages and more interindustry linkages than the other Illinois MSAs. These characteristics increase multiplier size.

Multiplier in hand, the most important part of an economic impact study is to accurately describe the direct impact of a project. This is illustrated in the proposed rural siting for a third Chicago airport.

The economic and political issues surrounding the proposed third airport are complex. A bistate commission composed of representatives from the City of Chicago, the State of Illinois, and the State of Indiana identified five potential sites for the airport: Lake Calumet on the southeast side of Chicago; Gary, Indiana; and three "green-grass" sites situated in rural Will and Kankakee counties. These sites can be evaluated in terms of costs and benefits.

The urban sites are more expensive to develop due to costs of relocating thousands of people and the razing of many homes and businesses. These sites are also pitted with landfills and toxic dumps and, despite gross pollution, harbor hundreds of acres of wetlands created in the aftermath of the last ice age. But in addition to costs, there are the potential benefits a third airport might bring. The consultants paid to study the issues do not agree about these potential benefits. There is no consensus on how much a new airport would be used and whether a rural site would be used as much as an urban site. There is also the possibility that expansion of existing airports at O'Hare and Midway would be a realistic alternative to a new airport, which, if built, would diminish or even eliminate the need for Midway. There are also matters of local, state, and federal politics. The U.S. Department of Transportation wants a new airport near Chicago or somewhere else in the Midwest.

One aspect of the debate that grabs headlines is the number of jobs the airport would create. A study by the City of Chicago claimed there would be 40,000 airport jobs and an additional 160,000 indirect and induced jobs created through the multiplier effect. But these estimates failed to take into account jobs taken away from O'Hare and Midway. In fact, the net number of new airport jobs would be closer to 10,000.

The analysis supporting this conclusion is sketched in Table 4. Direct job impacts at O'Hare, Peotone, and Midway are based on enplanement projections from Harrison and Nichols in *Economic Impacts of Alternative Future Airport Systems for the Chicago Region*, published by National Economic Research Associates of Cambridge, Massachusetts in 1991. The Harrison and Nichols projections for Peotone are modified to reflect the closing of Midway and increased growth in the south suburbs caused by the new airport. The net impact of the third airport is the difference in total metropolitan-area jobs with and without the new airport. The last column indicates that there would only be about 9,000 to 15,000 net new jobs created by the airport.

Most accounts of the net job impact of the third airport are grossly overestimated for two reasons. First, they fail to take into account jobs lost at existing airports. Second, they use multipliers that are too large. It should not be concluded, however, that a new airport is a bad idea because its net job impacts are relatively small. The important question is whether the benefits from better air transport facilities exceed the cost of the new investment; and this is the question that federal, state, and local officials should address.

Table 4. Employment Impacts of a Rural Chicago Airport Compared to the Existing System

Year	Direct jobs, O'Hare[1]	Total jobs from O'Hare in Cook[2]	Direct jobs, Peotone (A) or Midway (B)[1]	Total jobs from Peotone in Will (A) or from Midway in Cook (B)[2]	Direct jobs, CMSA[3]	Total jobs, CMSA[2]	Net new jobs
A. Scenario 1: O'Hare and Peotone							
2005	59,272	91,872	28,038	47,384	87,310	137,950	11,989
2010	64,514	99,997	32,121	54,284	96,635	152,683	15,018
2020	74,379	115,287	32,327	54,633	106,706	168,595	9,208
B. Scenario 2: The Existing System							
2005	62,170	96,364	17,552	27,206	79,722	125,961	----
2010	68,910	106,811	18,220	28,241	87,130	137,665	----
2020	81,323	126,051	19,555	30,310	100,878	159,387	----

[1]Direct jobs assume that 2,419 jobs are created per million origin and destination enplanements and that 963 jobs are created per million connecting enplanements. These figures represent averages of those previously used by the Illinois Department of Transportation and by TAMS Consultants, Inc., as reported in Harrison and Nichols (see text).
[2]Total jobs are calculated by multiplying the direct job effect by the relevant multiplier. TPU employment multipliers for Cook County (1.55) and the Chicago CMSA (1.58) are from Table 1. The multiplier for Will County is 1.69.
[3]Direct jobs in the Chicago CMSA equal the sum of O'Hare and Peotone direct jobs or the sum of O'Hare and Midway direct jobs.

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FARM ECONOMICS Facts & Opinions

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Issue 93-1 *January 1993*

Economic Multipliers for Metropolitan Areas in Illinois and Implications for the Proposed Rural Chicago Airport

Community economic developers are sometimes required to assess economic impacts. To cite some examples, in recent months Illinois developers have inquired into the economic impacts of:

- riverboat gambling in Moline
- a waste-to-energy facilty near Havana, Illinois
- casino gambling in Chicago
- ethanol production in Illinois
- a third Chicago airport

Consultants who provide the analysis for these and other studies sometimes use huge "multipliers" to inflate the economic impacts of a project. For example, consultants for a waste-to-energy facilty near Havana used a multiplier of 7, and the Illinois Department of Transportation used a multiplier of 5 for the proposed Lake Calumet airport. Maybe on Mars, but not in Illinois. *Farm Economics Facts & Opinions* 91-18 reported multipliers for rural Illinois counties. This issue presents multipliers for Illinois's metropolitan areas. The case of the proposed rural siting for a third Chicago airport illustrates how these multipliers are used to assist in evaluating local and state policies and projects in Illinois.

The multiplier refers to the indirect and induced spin-off effects of an economic impact. Suppose a new airport is built in a metropolitan area, creating 10,000 new jobs and generating $1 billion of net new income in the local economy. These are the direct impacts of the airport. But there are also indirect and induced effects. The airport uses machinery, trucks, fuel, financial services and other inputs from local industries to conduct its daily operations. Airline passengers also demand hotel and restaurant services and ground transportation in fulfilling their travel needs. These requirements represent the indirect, interindustry job and income effects from the airport. In addition, airport employees earn income, which they spend on groceries, housing, entertainment, and other consumer activities. Recipients of this income, in turn, buy groceries and other consumer goods. This spending generates jobs and income in local consumer industries and represents so-called induced effects in the metropolitan area. If the local employment multiplier in the transportation service industry equals 2, then each new job at the airport generates one additional job somewhere else in the urban economy from the indirect and induced effects.

There are many ways to calculate multipliers. Because multipliers are often used in project appraisal, it is useful to have bench marks. The following tables present bench-mark multipliers for Illinois's metropolitan areas. They are calculated using IMPLAN (IMpact PLANning), a 528-sector input-output model and data base developed by the Forest Service of the United States Department of Agriculture. Although no model is perfect, IMPLAN is superior to many other methods for calculating multipliers due to the detail in its data. Tables 1 through 3 present multipliers for 11 industries, which correspond to one-digit Standard Industrial Classification (SIC) code industries. Table 1

Table 1. Employment Multipliers for Illinois Metropolitan Areas

Sector	Cook County	Chicago CMSA[1]	Kankakee MSA	Rockford MSA	Davenport MSA[1]
Farm and Ag Services	1.23	1.30	1.40	1.44	1.52
Mining	1.59	1.63	1.38	1.37	1.39
Construction	1.39	1.42	1.34	1.37	1.43
Durables	1.44	1.46	1.37	1.51	1.44
Nondurables	1.65	1.71	1.58	1.62	1.66
TPU[2]	1.55	1.58	1.45	1.43	1.35
Wholesale	1.18	1.20	1.17	1.20	1.16
Retail	1.23	1.24	1.21	1.24	1.21
FIRE[2]	1.49	1.51	1.46	1.49	1.42
Services	1.34	1.35	1.30	1.32	1.28
Government and Other	1.17	1.18	1.17	1.19	1.16

Sector	Peoria MSA	Bloom.-Normal MSA	Champ.-Urbana MSA	Spring-field MSA	Decatur MSA	St. Louis MSA[1]
Farm and Ag Services	1.47	1.42	1.39	1.53	1.42	1.59
Mining	1.45	3.20	1.30	1.64	2.00	1.58
Construction	1.36	1.35	1.38	1.40	1.42	1.43
Durables	1.50	1.38	1.86	1.71	1.71	1.59
Nondurables	1.50	1.86	1.32	1.39	1.41	2.06
TPU[2]	1.40	1.47	1.32	1.36	1.43	1.58
Wholesale	1.18	1.16	1.15	1.19	1.23	1.24
Retail	1.23	1.20	1.20	1.24	1.27	1.29
FIRE[2]	1.49	1.55	1.44	1.47	1.51	1.54
Services	1.31	1.29	1.28	1.34	1.35	1.36
Government and Other	1.18	1.16	1.15	1.19	1.23	1.23

NOTES: All multipliers in Tables 1 through 3 are what IMPLAN calls "Type III" multipliers.
[1]The Chicago Consolidated Metropolitan Statistical Area (CMSA) is defined as Cook, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will counties. The St. Louis Metropolitan Statistical Area (MSA) is defined as the Illinois portion only, and consists of Clinton, Jersey, Madison, and St. Clair counties. The Davenport MSA is defined as the Illinois portion only, consisting of Henry and Rock Island counties.
[2]TPU means "Transportation and Public Utilities"; FIRE means "Finance, Insurance, and Real Estate."

Table 2. Output Multipliers for Illinois Metropolitan Areas

Sector	Cook County	Chicago CMSA	Kankakee MSA	Rockford MSA	Davenport MSA
Farm and Ag Services	1.48	1.48	1.31	1.35	1.38
Mining	1.25	1.27	1.20	1.23	1.22
Construction	1.42	1.43	1.21	1.29	1.21
Durables	1.40	1.42	1.23	1.34	1.30
Nondurables	1.39	1.42	1.29	1.35	1.46
TPU	1.43	1.42	1.25	1.26	1.22
Wholesale	2.29	2.26	2.60	2.47	2.32
Retail	1.55	1.60	1.41	1.49	1.43
FIRE	1.29	1.29	1.18	1.24	1.23
Services	1.44	1.47	1.40	1.43	1.38
Government and Other	1.41	1.46	1.38	1.43	1.33

Sector	Peoria MSA	Bloom.-Normal MSA	Champ.-Urbana MSA	Spring-field MSA	Decatur MSA	St. Louis MSA
Farm and Ag Services	1.34	1.26	1.27	1.36	1.24	1.52
Mining	1.23	1.14	1.18	1.19	1.16	1.30
Construction	1.28	1.24	1.20	1.21	1.28	1.33
Durables	1.26	1.29	1.50	1.28	1.17	1.38
Nondurables	1.33	1.36	1.23	1.27	1.28	1.40
TPU	1.24	1.26	1.29	1.24	1.31	1.46
Wholesale	2.95	2.78	2.93	2.67	3.30	4.27
Retail	1.48	1.45	1.42	1.43	1.54	1.68
FIRE	1.24	1.34	1.19	1.29	1.26	1.26
Services	1.41	1.37	1.34	1.39	1.44	1.56
Government and Other	1.41	1.35	1.33	1.38	1.48	1.63

NOTES: See Table 1.

Table 3. Total Income Multipliers for Illinois Metropolitan Areas

Sector	Cook County	Chicago CMSA	Kankakee MSA	Rockford MSA	Davenport MSA
Farm and Ag Services	1.36	1.46	1.37	1.50	1.61
Mining	1.24	1.25	1.19	1.22	1.22
Construction	1.48	1.48	1.25	1.37	1.24
Durables	1.47	1.49	1.32	1.43	1.37
Nondurables	1.57	1.62	1.39	1.44	1.63
TPU	1.40	1.41	1.28	1.28	1.22
Wholesale	2.14	2.11	2.53	2.40	2.26
Retail	1.51	1.56	1.42	1.50	1.42
FIRE	1.25	1.25	1.15	1.21	1.21
Services	1.35	1.37	1.36	1.38	1.34
Government and Other	1.21	1.23	1.20	1.23	1.18

Sector	Peoria MSA	Bloom.-Normal MSA	Champ.-Urbana MSA	Spring-field MSA	Decatur MSA	St. Louis MSA
Farm and Ag Services	1.45	1.29	1.32	1.46	1.30	1.59
Mining	1.23	1.12	1.18	1.20	1.17	1.28
Construction	1.35	1.29	1.24	1.28	1.36	1.33
Durables	1.41	1.34	1.92	1.53	1.46	1.48
Nondurables	1.45	1.61	1.31	1.37	1.35	2.01
TPU	1.23	1.27	1.27	1.21	1.29	1.40
Wholesale	2.90	2.53	2.88	2.70	3.17	3.82
Retail	1.49	1.41	1.44	1.47	1.53	1.60
FIRE	1.22	1.37	1.17	1.29	1.24	1.21
Services	1.37	1.30	1.31	1.37	1.40	1.45
Government and Other	1.23	1.17	1.18	1.23	1.26	1.31

NOTES: See Table 1.

presents the employment multipliers, Table 2 gives the output multipliers, and Table 3 shows total income multipliers.

Several points are worth noting about these tables:

1. In general, the multipliers are small and, in most cases, less than 2. (Note: The output and total income multipliers for "wholesale trade" as represented in these tables seem too high and may be attributable to a programming error in Micro IMPLAN version 89-03.)

2. Multipliers tend to be a little higher in the eight-county Chicago Consolidated Metropolitan Statistical Area (CMSA), the Illinois portion of the St. Louis Metropolitan Statistical Area (MSA), and Cook County than in other metropolitan areas. These three areas constitute larger economies and have fewer import leakages and more interindustry linkages than the other Illinois MSAs. These characteristics increase multiplier size.

Multiplier in hand, the most important part of an economic impact study is to accurately describe the direct impact of a project. This is illustrated in the proposed rural siting for a third Chicago airport.

The economic and political issues surrounding the proposed third airport are complex. A bistate commission composed of representatives from the City of Chicago, the State of Illinois, and the State of Indiana identified five potential sites for the airport: Lake Calumet on the southeast side of Chicago; Gary, Indiana; and three "green-grass" sites situated in rural Will and Kankakee counties. These sites can be evaluated in terms of costs and benefits.

The urban sites are more expensive to develop due to costs of relocating thousands of people and the razing of many homes and businesses. These sites are also pitted with landfills and toxic dumps and, despite gross pollution, harbor hundreds of acres of wetlands created in the aftermath of the last ice age. But in addition to costs, there are the potential benefits a third airport might bring. The consultants paid to study the issues do not agree about these potential benefits. There is no consensus on how much a new airport would be used and whether a rural site would be used as much as an urban site. There is also the possibility that expansion of existing airports at O'Hare and Midway would be a realistic alternative to a new airport, which, if built, would diminish or even eliminate the need for Midway. There are also matters of local, state, and federal politics. The U.S. Department of Transportation wants a new airport near Chicago or somewhere else in the Midwest.

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A. Scenario 1: O'Hare and Peotone							
2005	59,272	91,872	28,038	47,384	87,310	137,950	11,989
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Issue 93-2 *March 1993*

New Farmer Loan Programs Available to Illinois Farmers

The availability of credit is a limiting factor for many aspiring young farmers. Lenders often find it risky to finance new farm operations unless the farm manager has a financial history demonstrating his or her abilities and the viability of the operation. The credit barrier undoubtedly affects the number of farmers entering the industry. According to a study by the Library of Congress Congressional Research Service, the number of American farmers aged 65 and older increased by 20.7 percent from 1978 to 1987. During the same time period, the number of farmers less than 25 years of age fell by 46.2 percent, and the number of farmers between the ages 25 and 34 decreased by 15 percent. In Illinois, however, the average age of farmers is not increasing. From 1974 to 1987, the average age of Illinois farmers decreased slightly from 50.9 to 50.4. The number of Illinois farms, however, has declined significantly from 221,000 in 1940 to 82,000 in 1991. The loss of farms, accompanied by increased migration from rural areas to urban centers, has created a declining rural economy. Loan programs for young farmers are designed in part to revitalize rural communities and the agricultural sector.

This report describes and compares the current state and national new farmer loan programs available to Illinois farmers. Information about these new loan programs comes from the 1992 Agricultural Credit Improvement Act and the 1992 amendments to the Illinois Farm Development Act.

Illinois Farm Development Authority

Illinois's beginning farmers will have the opportunity, starting in February 1993, to apply for loans through the Young Farmer Guarantee Program. The Illinois Farm Development Authority (IFDA) has designated approximately $25 million for this program. The program was placed within the existing State Guarantee Program for Agri-Industries (SGPAI). The law allows for up to $35 million in outstanding loans in this program. Currently, approximately $10 million in loans are outstanding in the SGPAI. Although the program is called the "Young Farmer Guarantee Program," only a minimum age requirement (at least 18) is specified. The applicant must be a resident of Illinois, receive 50 percent or more of his or her gross income from farming, and have a net worth between $10,000 and $250,000. After the proposed purchase, the borrower's debt-to-asset ratio must fall between 40 and 70 percent.

Applicants are eligible for loans to finance the purchase of new capital items. Operating expenses are not eligible for financing under this program. Capital items to be financed may include—but are not limited to—real estate, machinery, breeding livestock, buildings, and soil and water conservation improvements. In conjunction with a purchase, some loans for refinancing to improve collateral position are also available. The refinanced amount may not exceed 50 percent of the total loan amount. More than one loan may be financed through the program, but the total principal amount of loans may not exceed $300,000 for any one borrower.

The maximum loan-to-collateral value for IFDA approval is usually 80 percent. The prospective borrower must prove all outstanding loans are current in repayment status. The maximum loan term is 15 years, although real estate loans may be amortized over 25 years with a balloon payment due in year 15. An interest rate about 1 percent below the current market rate is expected. The specific method of determining interest rates has not yet been finalized. IFDA will guarantee 85 percent of the principal and interest repayment with the lender assuming risk on the first 15 percent.

Agricultural Credit Improvement Act

This national program will be implemented through the Farmers Home Administration (FmHA). FmHA plans to implement interim regulations by April 28, and the public will have an opportunity for comment. Implementation of final regulations is planned for September 30. The program's opportunities are worth exploring. FmHA offers special loans for operating expenses, equipment purchases and repairs, and down payments for real estate loans.

Special operating loan program. Before receiving such loans, an eligible beginning farmer or rancher must prepare a detailed plan for the proposed operation. Any individuals (persons or entities other than corporations) whose owners are all related by blood or marriage and who have not operated a farm or ranch for more than five years are considered eligible. The plan must describe the proposed operation's first five years including expected management methods, commodity types and amounts, production methods, conservation measures, equipment and planned replacements, income and expenses, credit needs, and proposed location. Projected financial position of the operation after a maximum loan assistance period of 10 years is also required. This projection should demonstrate that after the maximum assistance period the farmer or rancher will no longer need FmHA direct or guaranteed operating assistance. The plan must be updated annually for continued loan assistance.

After plan approval, the borrower is eligible fo assistance to secure operating funds. Direct loans, 90-percent guaranteed loans, and interest rate subsidies may be made. The direct FmHA loans will be charged the interest rate for low income, limited resource borrowers (currently 5 percent). The guaranteed loans ar implemented through lenders other than FmHA (for example, banks or Farm Credit System institutions). The lender will receive a guarantee for 90 percent of the principal and interest payments. If the applicant does not qualify for a guaranteed loan or will be charge a higher interest rate than other guaranteed loan recipients, FmHA can provide an interest rate subsidy to the lender.

Direct loans and loan guarantees will also be provided for equipment purchase, repair, or improvement. The new farmer's approved plan must include these expected equipment needs. Financing the purchase of equipment in FmH inventory will be given priority.

Maximum levels placed on the amount of special assistance for the operating and equipment loans are the same as for FmHA's existing direct and guaranteed operating programs: $200,000 for direct loans and $400,000 for guaranteed loans. The act allows for a maximum of 10 years of special assistan for beginning farmers and ranchers.

Down payment loan program. Eligible begi ning farmers and ranchers may also apply for loans to cover down payments on farm mortgages. An eligible borrower for a down payment loan is a farmer or rancher who has operated a farm or ranch for less than 10 years. This person must materially and substantially participate in the daily labor and management of the operation. Total acreage owned (individually or through an interest in family corporation) prior to obtaining the loan may not exceed 15 percent of the median acreage of the farms or ranches in the county in which the subject property is located.

Note that eligibility regulations on the number of years operating a farm differ for down payment loans and special operating and equipment loans. The eligibility requirements change further if both types of assistance are desired. If a borrower has operated a farm for less than five years and wants both types of assistance, special operating and equipment loans (as specified in the borrower's plan) may be provided, but the borrower will not become eligible for the down payment loan until he or she has farmed for at least five years. An applicant with no farming experience may have to rent instead of buy farm land for the first five years of the proposed operation. There is no such restriction under FmHA's existing direct operating program, which will still be in effect when the new program is implemented.

If the borrower is eligible for a down payment loan, he or she must provide 10 percent of the purchase price of the farm or ranch. The total purchase price may not exceed $250,000. FmHA will provide up to 30 percent of the purchase price with a direct loan. Ten years is the maximum loan term with equal annual payments required. The interest rate will be 4 percent. The remaining balance of 60 percent--to be financed by another lender--can be guaranteed by FmHA with a minimum loan term of 30 years.

In addition to the beginning farmer sections, the act also provides additions to existing FmHA regulations. First, FmHA must establish a Certified Lender Guarantee Program to replace the existing Approved Lender Program. Paperwork will be reduced for all certified lenders and loan guarantee applications of $50,000 or less.

The act also limits the operating loan assistance period. An FmHA borrower is not eligible for a direct operating loan after the tenth year of first receiving one. An FmHA borrower cannot receive a guaranteed operating loan after the fifteenth year of first receiving a direct or guaranteed loan. The applicable transition period allows FmHA borrowers with direct loans for more than five years and/or guaranteed loans for more than ten years from the act's effective date (October 28, 1992) to receive assistance for five additional years. An addition has been made to the section targeting equal access to loan funds for socially disadvantaged groups. Now gender prejudice joins racial and ethnic prejudice, increasing the availability of credit to female farmers.

Comparing the Programs

Table 1 provides a brief comparison of the IFDA and FmHA new farmer programs. Although the financial requirements are more explicit in the IFDA program, this program has no specific requirements regarding years of farming experience as does the FmHA program. The IFDA loans have a 15-year maximum term; the FmHA loans have a 10-year term. FmHA loans will finance operating funds (as described in the operation's plan), equipment purchase and repair (also to be specified in the plan), and real estate down payment, while the IFDA loans will mainly finance purchase of capital items. The lenders supporting the IFDA program will probably require past, current, and projected financial information, but no specific, detailed plan is needed as in the FmHA program. Therefore, less "red tape" for both lenders and borrowers is expected with the IFDA program.

The IFDA loan interest rate will be approximately 1 percent below the current market rate. The FmHA interest rates will vary with loan type. The operating and equipment loans will be charged the low income, limited resource interest rate while the down payment loans will be charged the emergency loan rate. IFDA does not provide interest rate subsidies and direct loans as FmHA does. Both IFDA and FmHA guarantee loans, but these guarantees differ in liability level for the lender. FmHA guarantees 90 percent of the accrued principal and interest. The lender incurs a maximum of 10 percent of all losses. IFDA guarantees 85 percent of the principal and interest only after the lender absorbs the first 15 percent of the outstanding principal. Losses from unpaid interest are divided 85/15 between the state and lender, respectively.

Impact on Illinois Farmers

Although no explicit rules deter an Illinois farmer from utilizing both FmHA and IFDA new farmer programs, borrower characteristics may restrict eligibility. An applicant whose net worth is between $10,000 and $250,000 and who derives over 50 percent of his or her gross income from farming may already have over five years of farming experience and own acreage over 15 percent of the county median

Table 1. Comparison of New Farmer Programs

Characteristic	Loan type: FmHA — Operating and equipment loans	Loan type: FmHA — Down payment loans	Loan type: IFDA
Eligible applicant	· Natural person or entity other than a corporation · All owners related by blood or marriage · Operated a farm or ranch for less than 5 years · Applicant participates in daily labor and management of farm · Applicant does not own land (or owns acreage of less than 15% of county average farm size)	Same as operating except: · Applicant has operated a farm or ranch for not less than 5 years but not more than 10 years	· Illinois resident · At least 18 years old · 50% or more gross income from farming · Postpurchase debt-to-asset ratio between 40% and 70% · Net worth between $10,000 and $250,000
Loan purchase	· Regular operating funds · Capital purchases or repair of equipment	· Down payment on farm or ranch real estate mortgage	· Purchase of capital items · Refinance to improve lien position in conjunction with a capital purchase
Loan term	· 10 years maximum on total assistance	· 10-year maximum	· 15-year maximum
Assistance type	· Direct loan · 90% guaranteed loan · Interest rate subsidy	· Direct loan	· 85% guaranteed loan
Interest rate	· Direct: low income, limited resource rate or regular rate · Guaranteed: lender rate or interest rate subsidy	· 4 percent	· Approximately 1% below market
Principal amount	· Direct: $200,000 · Guaranteed: $400,000	· 30% of purchase price ($250,000 maximum purchase price)	· $300,000 maximum (per loan and in total)

farm size. The last two characteristics will make the farmer ineligible for the new beginning farmer FmHA loans.

However, FmHA's existing farm ownership and operating loan programs still provide opportunities for beginning farmers. The Agricultural Credit Improvement Act of 1992 requires FmHA to target a percentage of funds to beginning farmers (those who have farmed less than 10 years) under these programs, effective October 1. No five-year plan is required under the existing loan program, and as previously mentioned, there is no time restriction for the purchase of real estate as there is under the special operating loan program created by the act. Therefore, FmHA should be able to assist a substantial number of beginning farmers under its existing programs.

FmHA is still characterized as a lender of last resort. Assistance provided under the FmHA programs is designed for borrowers unable to obtain financing from commercial and cooperative lenders at reasonable rates and terms. Farmers able to prove past financial success may be more able to secure IFDA financing than the unexperienced, hopeful farmer. Those without proven farm success may require FmHA direct loan assistance rather than IFDA loan guarantees.

The new farmer programs provide excellent opportunities for eligible borrowers to obtain credit at lower interest rates. Use of both programs should help stimulate the rural economy by financing the entrance of beginning or young farmers into agriculture. Specific application instructions may be obtained from the IFDA at (217)782-5792 and your local FmHA office.

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Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 93-3 *March 1993*

The North American Free Trade Agreement and Illinois Agriculture

The proposed North American Free Trade Agreement (NAFTA) would begin an unprecedented experiment in economic integration. It would create a single market linking the industrial United States and Mexico, a developing country with one-third of the U.S. population but only one-tenth of our per capita gross domestic product.

Trade between the United States and Mexico has increased steadily in recent years, reaching $59 billion in 1990. In 1992, U.S. agricultural exports to Mexico totaled $3.7 billion.

In recent years, despite Mexico's overtures to open its economy and improve trade, it has retained selective and high levels of protection for many agricultural commodities. Import licensing requirements continue to restrict many U.S. agricultural exports, notably corn, poultry, and grapes. NAFTA represents an opportunity to provide a comprehensive agreement to eliminate the remaining trade and investment barriers between the U.S., Mexico, and Canada to the extent that it is possible.

NAFTA, if implemented, will establish two bilateral agreements affecting trade in agricultural products, one between the United States and Mexico, the other between Mexico and Canada. The U.S.-Canada Free Trade Agreement would continue to govern agricultural trade between those two countries.

If approved, NAFTA will eliminate all nontariff barriers to agricultural trade between the United States and Mexico over a ten- to fifteen-year period. These barriers will be converted into tariff-rate quotas (TRQ) or ordinary tariffs. TRQs provide for a higher tariff rate on imported goods after a specified amount of the product has entered the country at a lower rate.

The TRQ is designed to facilitate a transition to free trade for producers who might be adversely affected by increased imports. The quota tariff would progressively decline to zero over a ten- to fifteen-year period, depending upon the product.

Corn

Because corn is labeled as "import-sensitive" for Mexico, there will be a fifteen-year transition period before unlimited amounts of U.S. corn can move to Mexico completely free of duty. The United States would have a dutyfree quota of 2.5 million metric tons of corn, which will grow at the rate of 3 percent per year over the fifteen-year period. U.S. grain sorghum will receive immediate dutyfree status once NAFTA is in effect.

Soybeans

Mexico will eliminate tariffs on soybeans and soybean products over a ten-year period. Mexico has a seasonal tariff of 15 percent on soybeans. Under NAFTA, Mexico would immediately reduce the 15 percent tariff back to 10 percent, reduce the dutiable season, and then reduce the tariff to zero over a ten-year period. Tariffs on crude and refined soybean oil, soybean meal, and other minor oilseed meals and oils will be phased out over ten years.

Although U.S. feed-grain and oilseed producers would likely benefit from NAFTA provisions that provide for a transition to free trade over ten to fifteen years, the benefits would not be large because exports of these commodities to Mexico represent such a small proportion of total U.S. production. Inadequate port, rail, and road systems may limit expansion of Mexican imports of feed grains and oilseeds from the United States.

Wheat

The United States is a major supplier of wheat to Mexico. NAFTA is expected to increase Mexican incomes, leading to growth in wheat demand.

Mexico will eliminate its import licenses for wheat and replace them with a 15 percent tariff, which will be progressively reduced to zero over ten years. The agreement should lead to a 40 percent increase in U.S. wheat exports to Mexico and enhanced U.S. prices, production, and total exports over what would have happened without a NAFTA agreement.

Livestock, Dairy, and Poultry

NAFTA appears likely to stimulate increased exports of U.S. meat products to Mexico. The increased incomes in Mexico are expected to result in increased demand for livestock products. But the lower feed prices and higher Mexican incomes could lead to increased production in Mexico to supply their domestic market.

Meat and dairy products are among the main exports of the United States to Mexico. Mexico's main livestock export to the United States is live cattle. Dairy is an import-sensitive sector for Mexico so NAFTA provides for a fifteen-year transition period to free trade in that sector. Canadian dairy, poultry, and eggs are excluded from the agreement. Expanded exports of U.S. dairy products could be limited by increased dairy production in Mexico.

Under NAFTA, the United States will eliminate existing tariffs on cattle and on fresh, chilled, or frozen beef and veal imported from Mexico. Mexico will be exempt from import quotas that may be imposed under the U.S. Meat Import Act. Tariffs on Mexican imports of U.S. and Canadian swine and fresh, chilled or frozen pork and hams will be phased out over ten years.

Mexico's import licensing system for poultry will be converted to a TRQ and will be in effect for ten years. The United States will have a tariff-rate quota of 422 metric tons of milk powder that will grow at a 3 percent rate annually over ten years.

Fruits and Vegetables

Fruits and vegetables are among Mexico's main exports to the United States. But certain fruit and vegetable products are import-sensitive for U.S. producers. At certain times of the year Mexican imports are directly competitive with U.S. fruits and vegetables.

The U.S. fruit and vegetable industry has argued strongly for special NAFTA rules including long phase-out periods for seasonal tariffs, reinstitution of duties if surpluses occur, common sanitary and environmental standards, and exemptions for certain crops. U.S. tariffs on most fruit and vegetable products will be phased out by the end of ten years under the proposed agreement.

NAFTA is expected to encourage increased U.S. imports of some vegetables from Mexico, including cucumbers, bell peppers, fresh and frozen broccoli, fresh tomatoes, fresh asparagus, and melons. Many U.S. producers are concerned about the prospect of increased imports. However, any price effects are expected to be moderated by the ten- to fifteen-year phase-in period and will be tempered by seasoned tariff-rate quotas for some products, including fresh tomatoes, chili peppers, and watermelons.

Environmental and Social Concerns

The President and members of Congress in the border states believe that environmental conditions on the U.S.-Mexico border should be addressed before NAFTA can be approved. The growth of industry along the border has caused many difficult environmental problems.

Safety of imported food products is a major issue as are grading and food quality standards. U.S. agricultural producers and consumers have legitimate concerns about the Mexican government's ability to enforce standards equivalent to those of the United States. There is a concern that NAFTA may undermine the food safety standards established by

Congress and federal agencies and limit the ability of Congress to enact future food safety laws. Supporters of NAFTA claim that U.S. food safety standards will be maintained.

The agreement confirms the right of each country to establish sanitary measures that are based on scientific principles. Countries are assured that they will be able to implement ıese measures to provide the country's policy `protection, and that these measures will not result in unfair discrimination or disguised restriction on trade.

There has been some concern that NAFTA will promote widespread displacement of family farmers and farm workers in all three countries. And there is fear that Mexican farm families may be displaced, adding to the flow of migrants to the U.S. and Mexican cities.

Overall Effects

The expected production adjustments for Mexico's major agricultural products are expected to be proportionately larger than the changes expected in U.S. agriculture. A liberalized trade environment could lead to a net expansion in U.S. agricultural production of certain commodities such as feed grains. But the overall increase, especially in the short term, would be small because agricultural exports to Mexico represent a small proportion of U.S. production of affected commodities.

The expansion in U.S. agricultural imports from Mexico would also be small. However, Mexico's share of the U.S. market could increase slightly for certain horticultural crops.

Because domestic price and income support programs have been important in all three NAFTA countries, each country is to move toward domestic support policies that do not distort trade. Although a country may change its domestic support programs, such changes must be in compliance with obligations under NAFTA and the General Agreement on Tariffs and Trade.

The benefits of the free trade pact may take time to materialize. Although some believe that additional demand for U.S. feed grains and poultry products may emerge quickly, other economic conditions in Mexico may take time to improve, along with demand for other U.S. agricultural products. The key for U.S. trade expansion is growth in the Mexican economy that will stimulate demand for U.S. agricultural and nonagricultural products.

U.S. exports of sorghum, wheat, and soybeans would gain some in the short run under more liberal trade. But because Mexico's support for these commodities is less than for corn, production would decline by less and imports from the United States would increase only moderately. U.S. prices would probably increase by a small amount.

Over the longer run, the impacts on U. S. exports of corn, other grains, and soybeans depend on the income effects in Mexico of a freer trade arrangement. With higher incomes, Mexican consumers are likely to shift increasingly toward indirect consumption of corn and other feed grains in the form of meat.

Outside of agriculture, some labor leaders oppose NAFTA because they believe it will encourage many U.S. firms to move to Mexico where wages are lower. Even without NAFTA, American companies have established manufacturing facilities in Mexico. It is not clear whether a free trade agreement would increase these investments.

A spokesman for one farm organization summed up NAFTA: "There are some definite losers in American agriculture as well as some winners, although the impact on some segments of American farming is open to interpretation and how some events ultimately will play out."

Schedule for Approval

Congress is expected to vote on NAFTA sometime in 1993, although a postponement into 1994 is possible. Under the "fast-track" procedures that run through June 1, 1993, Congress has to vote on the agreement without amendments within 90 legislative days after the President has submitted the implementing legislation to Congress. Recently, an Administration spokesman stated that they would ask for an extension of this authority so Congress would have more time to consider the agreement.

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Issue 93-4 *April 1993*

On-Farm Research: Objectives and Process

A growing number of farmers are investigating alternative agriculture practices, practices that generally reduce inputs and at the same time sustain soil health and productivity. Operators are motivated by increasing concern about the environment as well as financial survival.

Many of these farmers are conducting research on-farm to address questions regarding alternative agriculture practices and products. The purpose of this type of research is not to make new discoveries but to test ideas or to adapt knowledge to their own unique situations.

Sometimes, ideas, new products, or innovations can be implemented quickly and easily; at other times, major investment is necessary. In all cases, a certain amount of risk is involved, making small-scale preliminary testing a good idea. We need on-farm research methods that are statistically valid and "farmable," methods that use existing equipment with little additional effort. These methods would give farmers a decision-making tool to help them evaluate alternative practices.

The Process

Many farmers use a strip-plot design to make simple treatment comparisons (Figure 1). In a strip-plot design, the plot width is one or two equipment widths and extends the length of the field. It is really a randomized complete block design. Treatments are randomized within blocks and replicated six times. Although larger plots (sometimes up to an acre) are convenient, they contain more within-plot variation than smaller university research field plots (from 0.01 to 0.10 of an acre). Careful planning is necessary to avoid confounding soil differences with treatments.

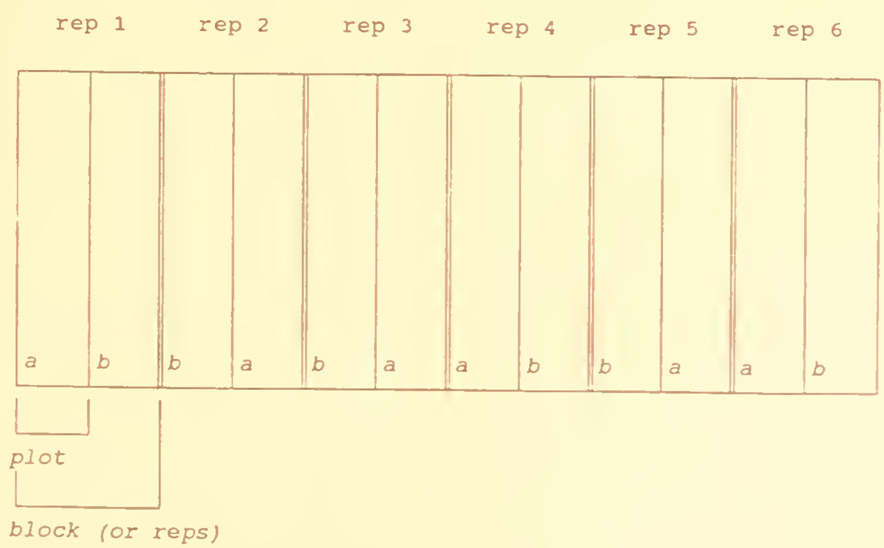

Figure 1. Strip-plot design with two treatments (a and b) and six replications.

The Illinois On-Farm Research Program

An on-farm research program has been ongoing in Illinois for about the last three years. In 1992, the university hired an on-farm research coordinator to educate farmer-researchers about the research process and to provide statistical support. Farmer-cooperators are contacted primarily through the Illinois Sustainable Agriculture Network, an umbrella organization linking grass-roots sustainable agriculture groups all over the state.

In the winter, projects are planned for the following growing season. The on-farm research coordinator meets with each cooperator to discuss ideas the farmers have for projects. He then helps design a replicated, randomized experiment to test the idea. In 1993, there will be approximately 70 cooperators.

A wide variety of projects is planned for 1993. For the first time, cooperators will be conducting livestock research. One southern Illinois cooperator is testing sow guards in his farrowing huts. He needs to know if the number of pigs that are saved from being crushed is enough to pay for the guards. A farmer in northern Illinois who raises rare Dutch Belted cattle is going to test the dry-matter production of different grass\legume mixtures. He is trying to extend the grazing season of his rotational grazing system.

Fruit and vegetable growers are also getting into the act. A new cooperator plans to test the yield effect of nitrogen placement on peach trees. One vegetable grower is tackling a fairly complex project looking at the interaction of two different tillage systems on different rates of calcium nitrate and the effect on tomato yields.

Many of the cooperators who are interested in the nitrogen-rate question will conduct their research a little differently this year. They have agreed to work together in a coordinated statewide study in which all cooperators will use the same rates. This level of cooperation will provide added benefits. There will be many more replications than could ever be produced by an individual farmer. This increase in replications allows us to detect smaller differences between the treatments being tested. Because the nitrogen-rate cooperators are distributed statewide, the test will be conducted on a wide variety of environments. As a result, the information will be useful to many producers across the state.

Each year the results of the projects are reported in a publication distributed by the Illinois Sustainable Agriculture Network.

Agro-Ecology Technical Notes: On-Farm Research

The University of Illinois publishes a quarterly newsletter, *Agro-Ecology Technical Notes: On-Farm Research.* It features articles dealing with issues that are pertinent to sustainable agriculture and on-farm research. The newsletter goes out to farmer-research cooperators and other interested persons. If you would like to be on the *A-ETN* mailing list, send your request to Dan Anderson, 305 Mumford Hall, 1301 W. Gregory Drive, Urbana, IL 61801.

The On-Farm Research Guidebook

The on-farm research coordinator is also working on an instructional publication called *The On-Farm Research Guidebook.* The *Guidebook* breaks the research process down into four components: the question, the experiment, the data, and the analysis. Basic statistical principles are explained and step-by-step instructions are given for conducting simple field research projects. Worksheets are provided for data collection and simple statistical analysis.

The Farm and Resource Management Laboratory

The on-farm research coordinator is located in the Farm and Resource Management (FaRM) Laboratory in the Department of Agricultural Economics.

The FaRM Lab's mission is to identify emerging issues and to focus research and education on helping operators to manage both the resources of agriculture and the business of farming.

The FaRM Lab seeks funding for applied economic research. It is currently involved in developing decision aids for farm managers and those who advise them, quantifying the roles of various inputs in agricultural production, and assessing the effects of state and federal policies on production agriculture.

In addition to these objectives, the FaRM Lab also works with the on-farm research coordinator in assessing the economics of alternative agricultural production systems. In this capacity, the FaRM Lab is involved in the on-farm participatory research program. Cooperating farmers fill out logbooks documenting all the inputs of each of the treatments being compared in their research projects. The completed logbooks are turned over to the FaRM Lab where the information is entered into a computer program that generates an economic analysis of the research. Treatments can then be compared on an economic basis, giving the on-farm researcher a picture of how each treatment affects profit.

This important analysis gives depth and meaning to the research experience for the cooperating farmers, and the information is becoming increasingly vital to cooperators who are using on-farm research as a decision-making tool. Consequently, the FaRM Lab is an important player in the on-farm research program.

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Issue 93-5 *April 1993*

Economies of Size in Hog Production: Is Size Related to Profitability?

Page through nearly any hog specialties magazine today and you will read that the smaller Midwest hog herds can't compete with the very large "mega-firm" hog enterprises or that "contract production" will replace the conventional Corn Belt hog producer. This analysis of economies of size of 705 Illinois hog enterprises in 1991 looks at this issue, using the Illinois Farm Business Farm Management (FBFM) records data base as the data source.

There is no doubt that the average hog enterprise on Illinois farms is getting larger. In 1972, the average farrow-to-finish hog enterprise in the FBFM records program averaged 99 litters farrowed, weaned 7.2 pigs per litter, and had a whole-herd feed/gain (F/G) ratio of 4.42 pounds of feed per pound of pork produced. In 1992, the average hog enterprise farrowed 227 litters, had a pigs-weaned average of 8.18 pigs, and had an F/G ratio of 3.68.

Was the improvement in pigs weaned and F/G ratio related to increased size of the enterprise, or had the managers of hog enterprises on Illinois Corn Belt farms improved production efficiency, allowing them to compete with mega-firm hog operations?

Framework for the Analysis

The development of personal computers and the electronic availability of the farm records data base allows us to explore the question of economies of size in hog production more easily.

What is efficiency? Efficiency is the desired result, or output, from a unit of input. Efficiency is expressed as a ratio, with the numerator being the desired output and the denominator the selected input or group of inputs. A common example is miles per gallon of gasoline. In hog production, pigs weaned per litter is an example. The numerator is the number of live pigs weaned and the denominator is the farrowing event or the bundle of resources used to produce a litter of weaned pigs.

Another example of a commonly used efficiency measure available in the FBFM data base is the whole-herd F/G ratio. Sometimes the efficiency ratio gets turned upside down. In this example, the F/G ratio shows the amount in pounds of feed (the input) required per pound of hogs produced (the output). We can correct this problem by simply reversing the ratio. For example, the traditionally used F/G ratio averaged 3.88 pounds of feed per pound produced on the 705 Illinois hog enterprises in our 1991 FBFM data base. When expressed as gain per pound of feed, the ratio is 0.2577 pounds of gain per pound of feed. In economic jargon, the commonly used F/G ratio is called a "cost function," and the gain per pound of feed is a "production function." Because both functions measure the same relationship, the traditional F/G form is used in the following analysis.

To translate the efficiency ratio from a biological to an economic measure, we can place dollar values on either the numerator or the denominator of the ratio or on both terms in the ratio. In other words, we can change a biological efficiency measure to an economic efficiency measure by expressing the ratio in dollar amounts.

What are economies of size and economies of scale? The terms economies of size and economies of scale are frequently used interchangeably. Economies of scale exist when resource inputs are used in constant proportions and the resulting output, or profits, increases at a compound rate. A simplified example: The net profits from a two-man, 1,000-acre grain farm are more than twice the net profits from a one-man, 500-acre farm. Economies of size exists when the resource inputs are **not** increased proportionately; instead, the net profits increase faster than the increase in inputs or resources. Inversely, economies of size are also observed when the amount and/or the cost of inputs per unit of output decreases as the firm (farm) gets larger in size. In nearly all analyses of empirical farming or hog enterprise data, the common relationship found is best described as economies of size. Therefore, we will use this concept in the following analysis of Illinois hog enterprises in 1991.

Economies of Size on Illinois Hog Farms in 1991

The FBFM data base was screened to identify farrow-to-finish hog enterprises that farrowed more than ten litters and sold all of their hogs at slaughter market weights. The resulting 705 hog-farm enterprises were then divided into three size groups, using litters farrowed annually as the measure of size. This traditional methodology of looking at the averages of size groupings of farms has been widely used in past analyses, but it may hide or obscure the real importance of the size of the hog enterprise on economic efficiency in producing market hogs.

The averages of the three size groups are shown in Table 1. There were 436 farms in the 10 to 199 size group, 220 farms in the 200 to 499 size group, and 49 farms in the over-500 group.

In this analysis, profitability per unit of size is measured by returns above feed cost per litter. The measure is calculated by dividing total dollar returns by litters farrowed. Included in total returns are hog sales, including salvage sow sales, less hog purchases, plus or minus any inventory price changes between January 1 and December 31. In 1991, there was a significant reduction in hog prices between the two inventory pricing periods; to eliminate any statistical variation introduced in the data by the accounting choice of inventory prices, each of the 705 farms was assigned an inventory price change equal to the average price change on all 705 farms. The net effect of this procedure was to eliminate the "statistical noise" or unexplained variations caused by an accounting procedure unrelated to profitability among individual farms in the sample.

Five performance measures were selected to reflect biological and economic efficiency over the size range of the sample farms. A simple cross-classification of enterprise size reveals that four of the five selected measures show an

Table 1. Hog Enterprises on Illinois Farms in 1991, Grouped by Litters Farrowed Annually

Items	All farms	Size, litters farrowed annually: 10-199	200-499	500+
Number of farms	705	436	220	49
Average litters farrowed	214	107	301	782
Returns above feed per litter	$314	$296	$333	$389
Farms above $389 average returns				
Percent of herds	36.4%	33.5%	40.4%	44.9%
Number of herds	257	146	89	22
Performance measures:				
Pigs weaned per litter	7.88	7.77	7.89	8.43
Feed per 100 lb. gain	388	393	383	366
Price per 100 lb. feed	$6.83	$6.88	$6.73	$6.77
Market price per 100 lb.	$47.69	$47.20	$48.18	$49.79
Death loss after weaning, %	5.99%	5.39%	7.01%	6.78%

improvement in performance as the size of the hog enterprise increases. Only percent death losses after weaning did not show a consistent size-related relationship.

Influence of each performance measure on profitability. The next question explored was: "How important is each of the five performance measures in explaining the variation in profitability among the 705 farms?" For this analysis, we employed linear regression methodology and applied the method in a stepwise procedure. The results are shown in Table 2.

Correlation methods cannot prove cause and effect, but they do show the co-variance or association of the variation of each of the individual measures of performance with the variation in profitability among the 705 farms. For example, pigs weaned per litter, a biological measure of performance, was associated with 23.34 percent (R^2 of 0.2334 out of 1.0) of the variation in profitability per unit of size.

The lefthand column in Table 2, labeled R^2, shows the effect of adding selected performance measures to the analysis. The righthand portion of Table 2 shows the effect of an individual performance measure with variation in profitability.

We may summarize this part of the analysis of economies of size from the data in Table 2 as follows. In 1991, just four measures of performance—pigs weaned per litter, feed per pound of gain, feed price per 100 pounds of feed, and market price of all hogs sold—explain 86.1 percent of the variation in profitability among the 705 farms. A fifth performance measure, percent death loss after weaning, was hypothesized to be important to profitability, but the data suggest otherwise. The small improvement in R^2 from 0.8610 to 0.8660 suggests the observation, often made by others, that it is the sick pigs that live—and not the pigs that die from disease—that cost the hog producer a lot in profits.

Table 2. Correlations Between a Measure of Economic Efficiency and Performance Measures, Including Size of Herd, on 705 Illinois Hog Farms, 1991

Correlation with returns above feed cost per litter[b]	Independent performance measures[a]					
	X_1	X_2	X_3	X_4	X_5	X_6
(R^2)	(correlation of each independent measure separately)[c]					
0.2334	0.2334					
0.4560	+	0.3547				
0.5944	+	-	0.0172			
0.8610	+	-	-	0.2719		
0.8660	+	-	-	+	0.0176	
0.8688	+	-	-	+	-	0.0470

[a] X_1 = pigs weaned per litter; X_2 = feed per 100 lb. gain; X_3 = feed price per 100 lb; X_4 = market price, all hogs sold; X_5 = death losses after weaning; X_6 = size of herd, litters.
[b] An example of interaction between independent performance measures is X_2, feed/gain, and X_3, feed price. Although price per 100 lb. feed has a small, separate effect, adding the additional variable to pigs weaned and feed per 100 lb. gain increased the overall correlation from 0.4560 to 0.5944, a gain of nearly 14 percent in explaining the variation in return above feed cost per litter.
[c] The correlation of each separate performance measure is entered on the diagonal. The combined correlation of successively adding performance measures is recorded in the left column.

When size of enterprise, measured by total litters farrowed, was added as an independent variable to the stepwise regression, we observe very minimal improvement in the correlation coefficient (0.8660 to 0.8688) in explaining the variation in profitability. When size of enterprise is considered alone, only 4.7 percent of the variation in profitability is associated with size of enterprise.

There is another important observation to be made from the data in Table 2. In calculating the measure of profitability, the only cost or input subtracted from total dollar returns was feed cost, which represents about 65 percent of the total cost of producing market-weight hogs. Neither the FBFM data base nor any other available empirical data base includes accounting data for nonfeed costs of hog production for labor, investments in buildings and equipment, and farm overhead expenses. There are two main reasons that data for fixed and variable nonfeed costs are not available. The first is that accounting methodology and income-tax considerations may affect the way bookkeeping costs of nonfeed resources are recorded. These accounting practices frequently do not match the way that economic costs of production are valued. The other reason is the desire of hog producers to protect the confidentiality of sensitive financial data.

Conclusions suggested by the analysis of data in Table 2. The size of a hog enterprise alone contributes very little to profitability per unit of production, as measured by returns above feed costs per litter farrowed. A second suggested corollary conclusion is that the managers of smaller hog enterprises can achieve the profits per unit of the larger hog enterprises by concentrating management efforts on the four performance measures identified in Table 2.

The first measure is pigs weaned per litter, and the importance of this performance measure should be no surprise to anyone who raises hogs.

The second and third measures are the F/G ratio and price per pound of ration. Because there is a tradeoff between feeding energy-dense rations and/or high-protein rations with the higher cost per pound of ration, the combined effect of these two performance measures is greater than their separate effects in explaining variations in profitability. For example, when we added price per 100 pounds of feed to the stepwise regression shown in Table 2, the correlation coefficient improved from 0.4560 to 0.5944, while the separate effect of feed price alone was only 0.0176. In other words, gains in F/G ratios achieved by paying higher prices for fat-enhanced, energy-dense rations and/or higher protein rations may improve the biological F/G ratio, but these rations may not be the most effective choice in achieving higher levels of profitability per unit of production.

The fourth measure of performance is price received per 100 pounds of hogs sold. The importance of this performance measure is affected by the price per pound of hogs sold from each farm, and by the way the accounting system accounts for trucking and commission charges for hogs sold. On smaller farms, trucking and selling commission charges are often deducted when arriving at the "net" sale price. The largest farms may use their own trucking equipment to deliver hogs directly to slaughter points and record transportation costs in their bookkeeping system with machinery and equipment charges.

Overall, the four performance measures explain 86.1 percent of the variability in profits per unit of production. They also suggest that smaller hog producers who excel in these performance measures can equal or exceed the per-unit profit levels of the larger enterprises in our data base. In other words, size alone may not be important in achieving higher levels of profitability in hog production.

The data displayed in Table 3 substantiate the preceding observation. The two smaller-sized hog groupings include 93 percent of the 705 farms and produce 75 percent of all the hogs. Within the two smaller size groups, 28.2 percent of the total hogs produced on all 705 farms resulted in a return per unit of production equal to or greater than the average returns of the 49 largest farms. The 49 largest farms produced only 11.4 percent of all hogs produced on the 705 farms at a return of $389 per litter or greater in 1991. Stated differently, 2.47 litters of hogs were produced on the 656 farms in the two smaller size groups at a profitability level of $389 per litter or higher for every one litter produced at equal profit levels on the 49 largest farms.

Table 3. Performance Measures on Small- and Medium-Size Herds Equal to or Greater than the Average of Selected Performance Measures on the 49 Herds Farrowing Over 500 Litters Annually

Items	Size, litters farrowed annually		
	10-199	200-499	500+
Number of farms	436	220	49
Average litters farrowed per farm	107	301	782
Total litters farrowed	46,652	66,220	38,318
Returns above feed per litter	$296	$333	$389
Farms above average of 500+ herds	146	89	22
Percent of all hogs produced[1]	10.4%	17.8%	11.4%
Pigs weaned per litter	7.77	7.89	8.43
Farms above average of 500+ herds	117	62	23
Percent of all hogs Produced[1]	8.3%	12.4%	11.9%
Feed per 100 lb. gain	393	383	366
Farms above average of 500+ herds	160	99	27
Percent of all hogs produced[1]	11.3%	19.8%	14.0%
Market price per 100 lb.	$47.20	$48.18	$49.79
Farms above average of 500+ herds	49	41	16
Percent of all hogs produced[1]	3.5%	8.2%	8.3%

[1]Percent of all hogs produced on the 705 farms, within each size group, that exceeded the selected average performance measure for the 49 herds farrowing over 500 litters annually.

Conclusions

Size alone contributes very little to economic efficiency, or economies of size, as measured by returns above feed costs per litter farrowed. And when we look at averages of data from cross tabulations of various size groupings without looking at the meaning of the data within the size groups, the results often lead to questionable conclusions about economies of size. What is important to profitability is the managerial talent of the individual managers who are producing hogs, regardless of the size of the hog enterprise.

It should also be noted that, on a majority of Corn Belt farms, a hog enterprise is supplementary to corn, wheat, and/or soybean production and occasionally beef or dairy cattle. The typical Corn Belt farm operator does not depend solely on his hog enterprise for a source of net farm income; the owners of a "mega-hog farm," however, are highly specialized, and many must purchase their feed resources from the grain trade or nearby grain farmers.

Also, the typical Corn Belt hog farm utilizes significant amounts of unpaid labor and management and the owner's equity capital in the bundle of resources used to produce hogs. These resources are rewarded by the "residual returns" left after inputs purchased in the market are paid for. Although our data base does not cover the very large hog farms, it is likely that, in most situations, the mega-farm must pay cash prices in the marketplace for most—if not all—of these same resources.

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Issue 93-6 *May 1993*

Cost of Growing Corn and Soybeans in 1992

In 1992, the total of all economic costs per acre for growing corn in Illinois averaged $335 in the northern section, $344 in the central section with the higher soil ratings, $310 in the central section with the lower soil ratings, and $263 in the southern section. The soybean costs per acre were $266, $276, $246, and $208 respectively (Table 1). Costs were lower in the southern section primarily because land costs are lower there. The total of all costs per bushel in the different sections of the state ranged from $1.73 to $2.20 for corn and from $4.73 to $5.66 for soybeans. Variations in this cost were related to weather factors, yields, and land quality.

These figures were obtained from farm business records kept by farmers enrolled in the Illinois Farm Business Farm Management Association. The samples included only farms with more than 260 acres of productive and nearly level soils in each area of the state; these are farms without livestock. Farms located in 22 counties north and northwest of the Illinois River are included in the sample for northern Illinois. Farms from 36 counties below a line from about Mattoon to Alton are in the sample for southern Illinois. The remaining 44 counties make up the sample for central Illinois (Figure 1). The sample farms averaged 750 tillable acres in northern Illinois, 808 acres in the central section with high soil ratings, 812 acres in the central section with lower soil ratings, and 1,002 acres in southern Illinois.

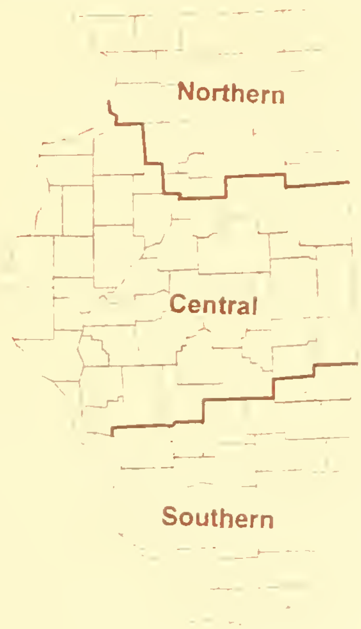

Figure 1. Geographical distributions of farms in this study.

This economic analysis includes some factors in the cost of doing business that nonagricultural businesses may not include. These factors are not used as expense items on income-tax returns. Examples include the charge for labor performed by the farm operator, a rental charge for the use of owned and rented land, and an interest charge on equity in machinery and inventories of grain and livestock. In the short run, farm operators may continue to produce without covering these total economic costs of production. However, if returns do not equal the total economic cost of production in the long run, it will be difficult to maintain the

Table 1. Cost per Acre of Growing Corn and Soybeans on Illinois Grain Farms Without Livestock in 1992

	Corn				Soybeans			
	North	Central[1]	Central[2]	South	North	Central[1]	Central[2]	South
Number of farms	336	615	334	243	336	615	334	243
Acres in crop	415	403	399	406	288	377	365	412
Nonland Costs								
Variable costs:								
Soil fertility	$ 47	$ 52	$ 49	$ 51	$ 15	$ 17	$ 16	$ 17
Pesticides	25	24	22	22	26	25	24	23
Seed	26	24	25	21	13	13	13	14
Drying and storage	16	14	12	5	6	6	6	2
Repairs, fuel, and hire	28	26	26	30	22	22	22	26
Total, variable costs	$ 142	$ 140	$ 134	$ 129	$ 82	$ 83	$ 81	$ 82
Percent change from 1991	3	2	5	8	3	0	4	5
Other nonland costs:								
Labor	$ 30	$ 30	$ 29	$ 29	$ 29	$ 28	$ 26	$ 27
Buildings and storage	8	6	5	5	5	3	3	3
Machinery depreciation	20	20	17	18	16	16	14	15
Nonland interest	17	18	15	11	16	16	13	10
Overhead	14	13	14	10	14	13	13	10
Total, other costs	$ 89	$ 87	$ 80	$ 73	$ 80	$ 76	$ 69	$ 65
Total, nonland costs	$ 231	$ 227	$ 214	$ 202	$ 162	$ 159	$ 150	$ 147
Percent change from 1991	0	0	3	3	-1	-1	3	1
Land costs								
Taxes	$ 17	$ 20	$ 15	$ 8	$ 17	$ 20	$ 15	$ 8
Annually adjusted net rent	87	97	81	53	87	97	81	53
Total land cost	$ 104	$ 117	$ 96	$ 61	$ 104	$ 117	$ 96	$ 61
Total, all costs	$ 335	$ 344	$ 310	$ 263	$ 266	$ 276	$ 246	$ 208
Percent change from 1991	-1	0	2	2	-2	-1	1	0
1992 yields, bushels per acre	152	176	157	152	47	49	46	44
Nonland cost per bushel	$1.52	$1.29	$1.36	$1.33	$3.45	$3.24	$3.26	$3.34
Total, all costs per bushel	$2.20	$1.95	$1.97	$1.73	$5.66	$5.63	$5.35	$4.73
1989-1992 average yield	135	150	132	122	45	48	43	39
Nonland cost per bushel	$1.71	$1.51	$1.62	$1.66	$3.60	$3.31	$3.49	$3.77
Total, all costs per bushel	$2.48	$2.29	$2.35	$2.16	$5.91	$5.75	$5.72	$5.33

NOTE: The entries shown below the line are costs based on 1989-1992 average yields.
[1] Soil productivity ratings of 86 to 100.
[2] Soil productivity ratings of 56 to 85.

same level of resources in the farm firm. In addition, producers will be challenged to lower their cost of production and/or increase volume as profit margins remain narrow.

Nonland Costs

Soil fertility costs for soybeans were allocated on the basis of phosphorus, potassium, and lime removal, with the residual cost allocated to corn. The seed, crop, pesticide, and drying expenses also included some commercial drying and storage and the estimated value of home-raised seed. The costs of fuel, machine hire, and machinery repair were reduced for income received from custom work. Labor costs included the cash value of hired labor, plus a charge for available unpaid labor at a rate of $1,500 per month. This rate represents a charge for only the physical labor input, not including a charge for management. Building and storage costs were for repairs and depreciation only. The nonland interest rate in 1992 was set at 7 percent; this figure was then multiplied by the sum of half the average inventory value of crops at the beginning and the end of the year, the depreciated value of machinery and buildings, and half the total operating expenses. The result is the total nonland interest charge. Overhead costs included insurance, utilities, the farm share of light vehicle expenses, and miscellaneous items. As mentioned above, no charge has been made in this analysis for management, but it may normally be about 7 percent of the total cost per bushel, or 10 to 15 cents for corn and 30 to 40 cents per bushel for soybeans.

Land Costs

Land costs included the adjusted net rent and the real-estate taxes. Net rent was represented as the average rent received by crop-share landlords on record-keeping farms for the period 1988 to 1991. Caution is needed in interpreting differences in land costs between areas. In the long run, the net rent residual return to landowners should tend to equalize the total cost of production.

Cost per Bushel

Production costs per bushel of corn decreased in 1992 for all areas of the state compared to 1991 due to higher yields. The cost per bushel was at its lowest level in a number of years. The decrease in costs per bushel ranged from $0.68 in the central Illinois section with the higher soil ratings to $1.14 in the central Illinois section with the lower soil ratings. The average corn yield in 1992 was 45 bushels per acre higher than in 1991 in northern Illinois, 57 bushels per acre higher in southern Illinois, and 45 to 59 bushels per acre higher in central Illinois. The 1992 average corn yield in the different geographical locations was 17 to 30 bushels per acre above the four-year average from 1989 to 1992. Total costs per acre decreased slightly in northern Illinois and remained the same or increased slightly in central and southern Illinois. All areas of the state incurred higher drying costs due to the larger crop harvested at a higher moisture content. Nonland interest charges decreased in all areas of the state mainly due to lower interest rates.

Production costs per bushel of soybeans also decreased in 1992 compared to 1991 for all areas of the state as a result of increased yields. Soybean yields were at or near record-high levels for many areas of the state. The decrease in costs per bushel ranged from $0.41 in the central Illinois section with the higher rated soils to $1.40 in the central Illinois section with the lower rated soils. Costs per bushel in southern Illinois decreased by $0.86 with yields 7 bushels per acre higher than the year before. Average soybean yields in northern and central Illinois increased by 3 to 10 bushels per acre. Total costs per acre decreased slightly in northern Illinois and on the higher rated soils in central Illinois and increased slightly on the lower rated soils in central Illinois. Total costs remained basically the same in southern Illinois. Average soybean yields in the different areas were 1 to 5 bushels per acre higher than the four-year average from 1989 to 1992.

Cost per Acre

Total costs per acre to produce corn remained basically the same as compared to the year before and were at their lowest level for any of the last ten years. These costs have been declining from 1983 through 1992, decreasing from $374 per acre to $321 per acre (Figure 2). Most of this decrease occurred in machinery depreciation and interest charges. Total costs per acre have varied only $13 the last five years. Cash costs such as fertilizer, pesticides, and seed declined very little during this period. Cash costs have varied from $142 to $130 per acre. Total cost per acre to produce soybeans also decreased, dropping from $259 per acre in 1991 to $255 per acre in 1992 (Figure 3). Total costs per acre were $296 in 1983. All of this

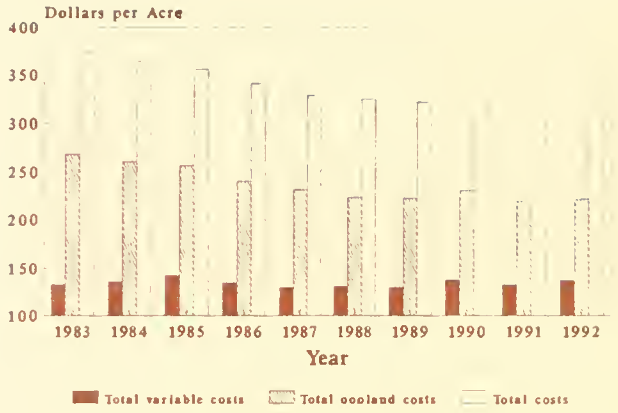

Figure 2. Total costs per acre to grow corn on Illinois grain farms

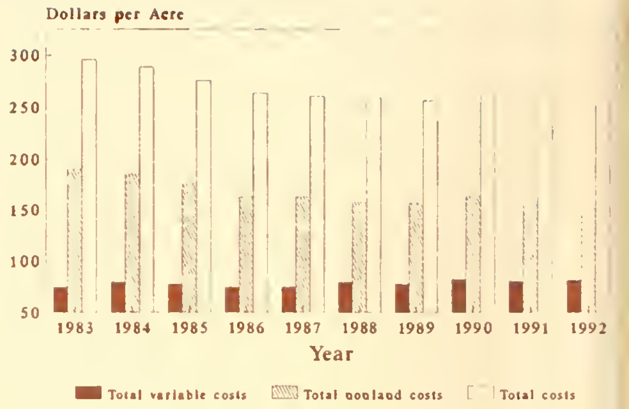

Figure 3. Total costs per acre to grow soybeans on Illinois grain farms

decrease had come from the other nonland (machinery depreciation and nonland interest) and land costs. Variable costs have actually increased slightly since 1983. Pesticide costs have increased from $18 per acre to $25 per acre during this time span. The factors that reduced the total cost per acre to produce corn were also the factors reducing soybean costs. After an extended period of moderately declining costs per acre during the early and mid-1980s, total costs seem to be leveling off. Lower interest rates, reduced capital expenditures, a shift towards no-till or reduced tillage operations, and an increase in the size of farms, which utilizes labor and machinery more efficiently, are all reasons for the reduction in total costs per acre that has occurred in the last ten years.

Cost Comparison

Average variable costs per bushel of corn for the five-year period 1988 through 1992 ranged from $0.99 in the central Illinois section with the higher rated soils to $1.13 in northern Illinois (Table 2). Total costs per bushel ranged from $2.33 in southern Illinois to $2.76 in northern Illinois. Although variable costs per bushel did not vary greatly between the different geographic areas, total costs per bushel were lower in southern Illinois due to lower land costs.

Average variable costs per bushel of soybeans ranged from $1.84 in the central Illinois section with higher rated soils to $2.22 in southern Illinois. Total costs per bushel varied from $5.78 in southern Illinois to $6.48 in northern Illinois. Total costs per bushel for corn were lower in southern Illinois due to lower land costs.

Break-even Requirements

Current selling prices for corn and soybeans are below the average total 1992 cost of production when using the average yield for the past four years for northern Illinois, near the current selling prices for central Illinois, and above the current selling prices for southern Illinois. An owner-operator with average yields during the past four years (1989-1992) would need $0.80 to $0.93 per bushel for corn and $1.69 to $2.48 per bushel for soybeans to recover the variable costs listed in Table 1. Recovering the total of all costs would require receiving $2.16 to $2.48 a bushel for corn and $5.33 to $5.91 a bushel for soybeans. Individual tenants and landowners computing the average break-even cost per bushel for growing corn and soybeans should divide the costs and yields shown in the table as they are shared by the terms of the lease.

Impact on Farmland Values

Farmland values generally are related to grain prices and the nonland costs of production because, under traditional crop share leases, income left after other costs have been deducted is considered the return to land. Even with fixed cash-rent leases, grain prices and nonland costs of production will have a bearing on what farm operators will be willing to pay

	Corn				Soybeans			
	North	Central[1]	Central[2]	South	North	Central[1]	Central[2]	South
Soil productivity rating	83	93	77	60	83	93	77	60
Yield per acre	123	137	117	115	42	44	39	37
Variable cost per acre	$139	$135	$129	$127	$ 81	$ 81	$ 79	$ 82
Variable cost per bushel	$1.13	$0.99	$1.10	$1.10	$1.93	$1.84	$2.03	$2.22
Total costs per acre	$340	$344	$311	$268	$272	$277	$247	$214
Total costs per bushel	$2.76	$2.51	$2.66	$2.33	$6.48	$6.30	$6.33	$5.78

[1]Soil productivity ratings of 86 to 100.
[2]Soil productivity ratings of 56 to 85.

to cash rent land, which, in turn, affects farmland values. Values for Illinois farmland have increased by about 30 percent since 1987 after having declined by almost 50 percent since 1979. The increase in land values was due in part to improved farm earnings and a return to farmland that was more competitive with alternative nonfarm investments. Farm earnings for 1992 will be higher for most areas of the state when compared to 1991. Earnings in northern Illinois improved in 1992 compared to 1991 but not as much as in other areas due to adverse growing conditions. Frost damaged some crops in the spring, and a late, wet fall reduced yields and increased drying costs. The financial side of the agricultural sector has been improving during the last five years compared to the early and mid-1980s. However, incomes have varied considerably due to variations in crop yields. Farm operators will need to continue to monitor their financial conditions closely and avoid excessive borrowing to finance their businesses. Risk management will be more important to farm operators as profit margins are narrower and crop yields seem more variable due to fluctuating weather conditions. To remain competitive in the future, farm operators will need to continue to monitor and control costs, use borrowed capital wisely, reduce risk when possible, and adopt new technologies that will economically increase the productivity of their farm business.

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Issue 93-7 *July 1993*

The Financial Position of Illinois Farm Operators: Costs and Returns from Crop and Livestock Enterprises

Record Yields Boost 1992 Farm Incomes

This report, based on the summaries of Illinois Farm Business records, reviews the financial status of Illinois farm operators. Farm operator earnings increased substantially in 1992 compared to the drought-reduced returns of 1991 and were at their highest level for a number of years (Figure 1). The higher returns were a result of record corn and soybean yields. The average corn yield for all farms in the study was 153 bushels per acre, compared to 111 bushels per acre in 1991. Corn yields were 11 bushels per acre higher than the previous record of 142 bushels per acre in 1985. Soybean yields of 46 bushels per acre tied the previous record in 1985. Gross crop returns for grain farms of \$324 per acre were \$58 per tillable acre above the 1991 returns. Returns to dairy and cattle producers in 1992 were above 1991 returns while returns to hog producers were slightly lower. Farm earnings were highest in the central and southern areas of the state and lowest in the northern region. Northern Illinois experienced a difficult growing season; frost in the spring damaged some crops. A late, wet fall also resulted in difficulties harvesting the crop, causing grain quality problems and increased drying costs.

Figure 1. Operator's share of net farm income and labor and management income, 1982 to 1992.

Records kept by 3,733 farmers enrolled in the Illinois Farm Business Farm Management Association (FBFM) record-keeping program have been used to estimate changes in net worth from 1989 to 1992. On a cost basis, without considering inflation or deflation of capital asset values, the change was calculated by adding net farm and net nonfarm income and subtracting family living expenses and income and Social Security taxes (Table 1). Using this procedure, the net worth of the average Illinois farm operator increased by $17,884 in 1989, $19,440 in 1990, decreased by $5,881 in 1991, and increased by $21,873 in 1992.

The change in net worth on a balance sheet based on fair market value would be affected positively if it included the change in land values. Land values have increased since 1988. Net worth changes would vary greatly among farms and areas in the state depending on the level of farm and nonfarm income and the amount of family living expenditures.

Net farm income is the accrued value of the operator's share of farm production less total operating expenses, including the amount of interest paid and depreciation, plus gain or loss on machinery or buildings sold. When added to net nonfarm income, this is the income available to pay for family living expenses and income and Social Security taxes. This is also the source of income used to pay the principal on intermediate and long-term debt and to invest in savings. Estimates used in Table 1 for net nonfarm income and withdrawals for living expenses and taxes were based on a sample of 403 Illinois farm families. Most of these farms were located in central Illinois. These families identified all sources of farm and nonfarm funds and the uses of these funds for precise expenditures. These expenditures were then adjusted downward by 10 percent to reflect the larger-than-average farms in central Illinois.

Capital Debt Repayment Capacity

The average amount available to each farm operator for repayment of capital debt was estimated at $33,406 in 1989, $35,424 in 1990, $9,292 in 1991 and $38,030 in 1992 (Table 1). These were the funds estimated to be available for capital purchases and payment of principal on intermediate and long-term debt. The table shows actual dollar commitments per farm that were made for capital purchases of machinery, equipment, or buildings. Results from the last four years indicate that, except for 1991, the amount spent for capital purchases has been less than the funds available for capital debt repayment. Total capital purchases in 1992 were 13 percent below 1991. Expenditures per tillable acre averaged $27, the lowest since 1988. Limited capital replacement during the mid-1980s combined with better farm earnings

Table 1. Estimated Change in Net Worth and Capital Debt Repayment of Capacity for 3,733 Illinois Farm Operators

	All Illinois counties			
	1989	1990	1991	1992
Net farm income	$44,156	$48,059	$25,294	$54,035
+ Net nonfarm income[a]	10,502	12,624	12,226	12,166
- Family living expenses[b]	29,538	32,743	33,208	35,173
- Income and Social Security taxes[b]	7,236	8,500	10,193	9,155
Change in net worth	$17,884	$19,440	($ 5,881)	$21,873
+ Depreciation	15,522	15,984	15,173	16,157
Funds available for capital debt repayment	$33,406	$35,424	$ 9,292	$38,030
Capital purchases	$18,440	$24,406	$21,757	$18,828
Cash interest paid	$14,775	$15,507	$15,617	$15,194

[a] Actual amounts identified from a sample of 402 farms for 1989, 1990, 1991, and 1992.
[b] Actual amounts identified from a sample of 402 farms for 1989, 1990, 1991, and 1992 reduced by 10 percent.

in 1989 and 1990 resulted in farmers starting to increase their capital purchases in 1990 and 1991. However, lower farm incomes in 1991 resulted in a reduction of purchases in 1992. Improved earnings in 1992 may result in increased purchases in 1993.

The records show that funds available for debt repayment varied between geographic areas in the state. Estimated changes in net worth in 1992 were positive for all areas of the state. Estimated changes in net worth ranged from an $8,000 to $12,000 increase in northern Illinois to a $30,000 to $33,000 increase in central and southern Illinois. Earnings were remarkably similar in central and southern Illinois.

Interest Paid as a Percentage of Gross Farm Returns

The amount of interest paid by an FBFM operator averaged 7.9 percent of gross farm returns in 1992, compared to 9.9 percent in 1991, 8.8 percent in 1990, and 8.9 percent in 1989. Higher gross farm returns were the main reason this figure decreased in 1992. The average cash interest paid in 1992 was $15,194. This was $423 lower than in 1991. This was the first year since 1988 that the amount of interest paid decreased compared to the amount of interest paid the previous year. Approximately 1 percent of the farm operators had negative incomes in 1992 (Figure 2). This group was paying over 35 percent of their gross farm returns for interest. Sixty-nine percent of the farm operators in 1992 paid less than 10 percent of their gross farm returns for interest. The average income for this group was $6,661 higher than the average income for all the farm operators. The percent of farm operators paying less than 10 percent of their gross farm returns for interest was at the highest level since the late 1970s.

Costs and Returns from Crops

Corn and soybean crops make important contributions to net farm incomes and the financial status of Illinois farm operators. Figures 3 and 4 show the cost and return per bushel of both corn and soybeans produced each year from 1983 to 1992 on 600 central Illinois grain farms with high-quality soils and no livestock. Note that the total cost of growing a bushel of corn has exceeded the average annual Illinois corn price in four of the ten years since 1983. The difference between the total of all costs and the total nonland cost line is the charge for the use of land. The deficits indicate that total returns for the year were below total economic costs, which includes a fair return to capital and unpaid operator labor. Income support provided by the government farm program has offset part of the deficits.

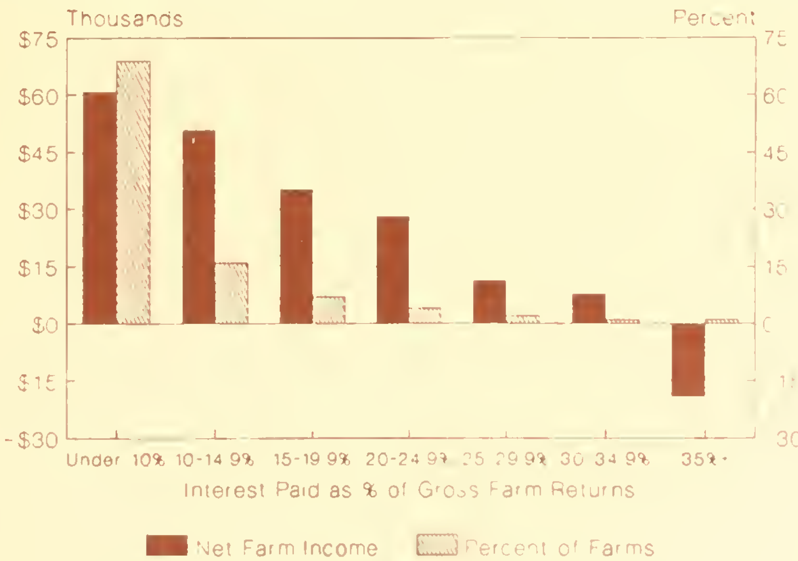
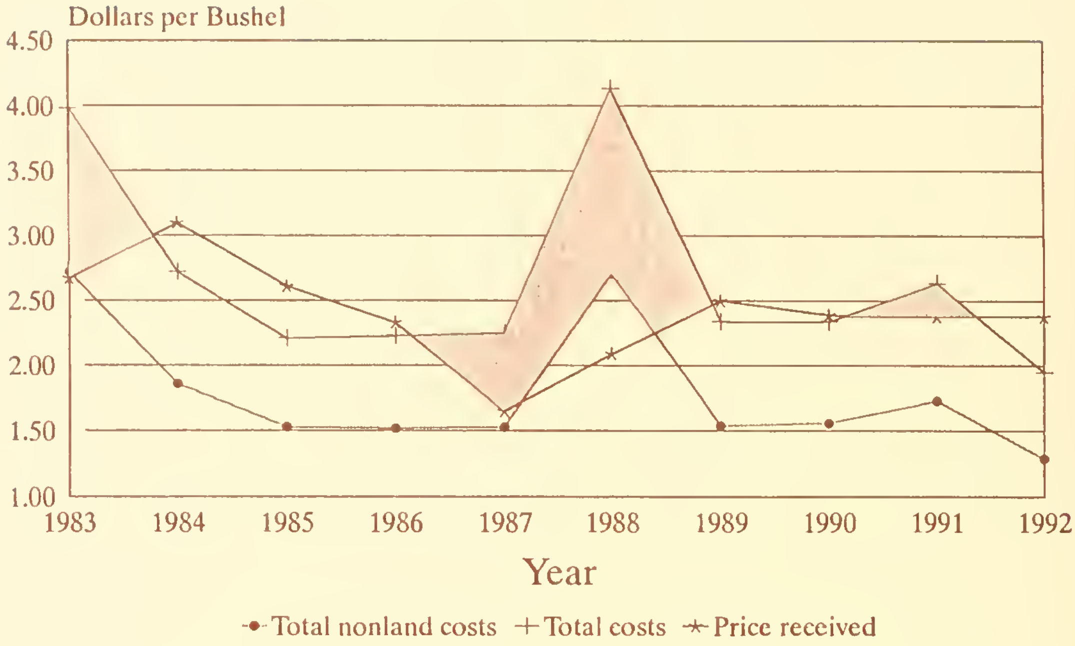
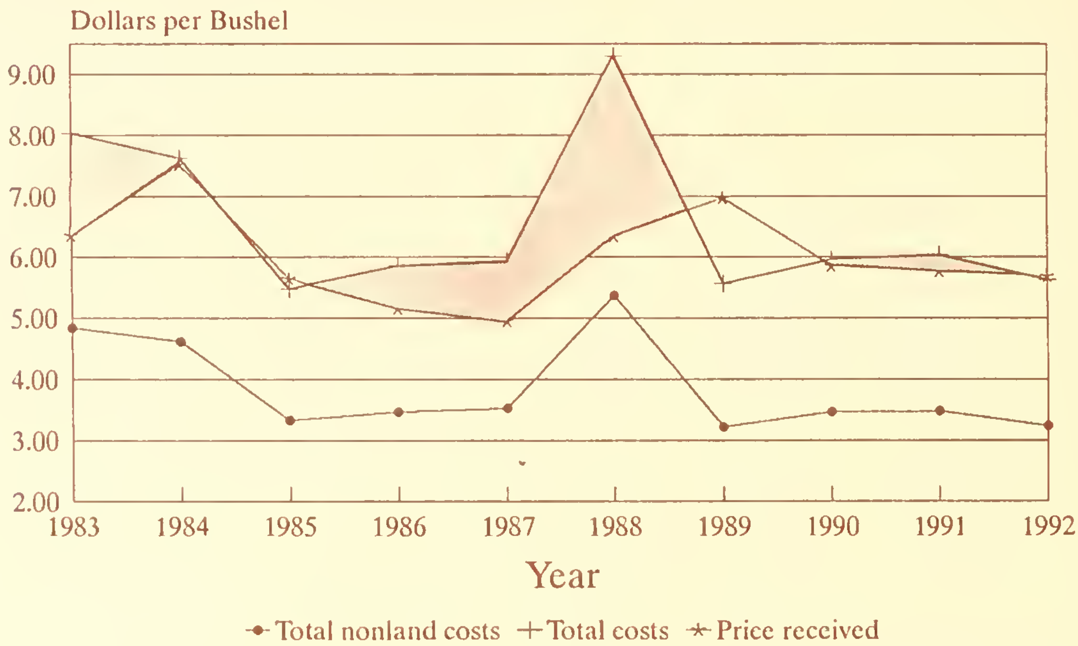


Figure 2. Operator's average net farm income and percent of farms by interest paid as a percent of gross farm returns, 1992.



Soil Productivity Rating 86 - 100

Figure 3. Cost and return per bushel of corn on central Illinois grain farms, 1983 to 1992.



Soil Productivity Rating 86 - 100

Figure 4. Cost and return per bushel of soybeans on central Illinois grain farms, 1983 to 1992.

Variable cost, part of the nonland costs, reflects the total of cash expenditures for fertilizer, pesticides, seed, and drying, which are normally shared according to the terms of the lease on rented farms, plus the cost of fuel and machinery hire and repair. Other nonland costs include labor, depreciation, interest, building upkeep, and overhead.

Total costs per acre of corn produced in 1992 did not change from these costs in 1991. However, higher yields on these sample farms resulted in the cost per bushel of production in 1992 to decrease to $1.95 per bushel compared to $2.63 in 1991. Using the past four-year average corn yield of 150 bushels per acre, costs per bushel of corn produced are now averaging about $0.93 for the variable cost, $1.51 for the total nonland cost, and $2.29 for the total cost.

Figure 4 shows the cost and return per bushel of soybeans produced on these same farms from 1983 to 1992. The total cost has exceeded returns each year since 1983 with the exception of 1985, 1989, and 1992. Total costs per acre declined by 1 percent in 1992. Higher yields caused the cost per bushel to decrease by 41 cents in 1992. Using the past four-year average yield of 48 bushels per acre, costs per bushel are now averaging about $1.73 for the variable cost, $3.31 for the total nonland cost, and $5.75 for the total cost.

Costs and Returns from Livestock

Livestock has also been important to the current financial status of farm operators. The cost and return per hundredweight of pork produced annually from 1983 to 1992 on an average sample of 98 farrow-to-finish enterprises with an average of 452 litters per year are shown in Figure 5. Returns to farrow-to-finish hog producers were slightly lower in 1992 compared to 1991. Returns in 1992 were also lower than the last five-year average. This decline was mainly due to a 13 percent decrease in the average price received for market hogs. Feed costs remained relatively stable during the year.

The average returns above the cost of feed and purchased animals from 1988 to 1992 from the annual records of about 1,500 individual livestock enterprises are shown in Table 2. This is the return available to pay for labor, machinery, equipment and building repairs, depreciation, livestock expense, taxes, overhead, and an interest charge on all capital used. There is no economic profit until these costs are covered. The last five-year average returns from the farrow-to-finish hog and dairy enterprise covered total costs. The feeder-pig finishing enterprise operated slightly below a break-even level. Based on the estimates of nonfeed costs in Table 2, the average returns above all costs from 1988 to 1992 for farrow-to-finish hogs

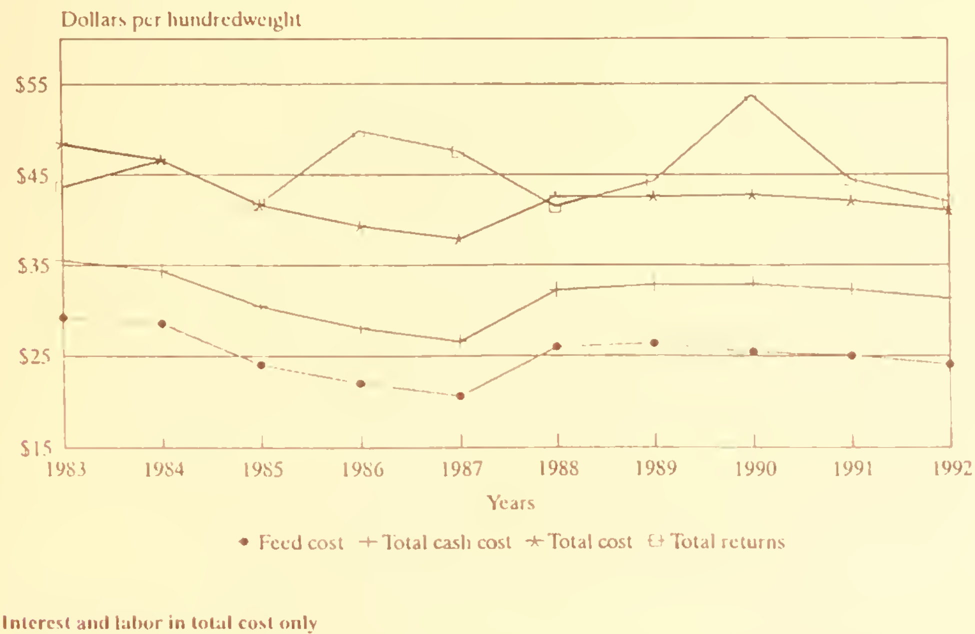


Figure 5. Cost and return per 100 pounds of pork on farms with over 250 litters, 1983 to 1992.

Table 2. Returns above Cost of Feed and Purchased Animals to Livestock Enterprise Units from 1988 to 1992

Year	Farrow-to-finish hogs	Feeder-pig finishing	Feeder cattle	Dairy cattle	Beef herd calves sold[a]
	-------per hundredweight-------			*-----per cow-----*	
1988	$14.01	$ 6.63	$20.56	$1,116	$157
1989	16.71	10.20	18.66	1,334	144
1990	27.15	15.79	25.74	1,471	203
1991	17.67	6.80	3.97	1,064	88
1992	16.45	9.39	25.40	1,398	125
5-year average	**$18.40**	**$ 9.76**	**$18.87**	**1,277**	**$143**
Nonfeed costs, 1988-1992					
Direct cash	$ 6.60[c]	$ 4.20[b]	$13.10[c]	$ 431[c]	$ 30[b]
Other costs	10.21[c]	6.50[b]	11.05[c]	632[c]	175[b]
Total	**$16.81**	**$10.70**	**$24.15**	**$1,063**	**$205**

[a]The feed cost for beef herds includes up to $60 of hay equivalent from salvage roughage.
[b]Includes veterinary costs, utilities, fuel, equipment and building repair costs, depreciation, labor, and other nonfeed costs, including interest on feeder livestock, from Table 6, *Farm Management Manuals*, 1987 to 1991.
[c]Estimates of annual nonfeed costs are based on enterprise cost studies of operative units from 1988 to 1991.

were $18.40 (returns above feed and purchased animals) minus $16.81 (nonfeed costs), or a positive $1.59 per 100 pounds produced. For feeder-pig finishing enterprises, total costs per hundredweight exceeded returns by an average of $0.94. Feeder cattle showed returns per hundredweight that were $5.28 short of covering all costs; dairy returns averaged $214 per cow above all costs, whereas beef cow herds were $62 short per cow.

Returns to dairy and cattle producers in 1992 were above the 1991 returns, while returns to hog producers were slightly lower. Prices received for market hogs were 13 percent lower in 1992 compared to 1991, while slaughter cattle prices were 1 percent higher and milk prices were 12 percent higher. Feed costs, the largest single expense item in raising livestock, were slightly lower. Feeder cattle and dairy enterprises realized a positive return to management, which meant returns were more than total economic costs. Returns to most livestock enterprises improved last year as consumer demand remained strong for livestock products. Livestock producers continue to increase the size and efficiency of their enterprises. Pigs weaned per litter averaged 8.18 pigs per litter, the highest ever, while feed conversion was at its lowest ever, averaging 368 pounds of feed per 100 pounds of pork produced. The average amount of milk produced per cow was over 17,000 pounds for the first time, averaging 17,125 pounds. Future returns will depend to a great extent on when and to what degree producers respond to various profit margins by increasing or reducing production and by continuing to improve production efficiencies.

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FARM ECONOMICS Facts & Opinions

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Issue 93-8 *July 1993*

Farm and Family Living Income and Expenditures, 1989 through 1992

In 1992, the total, noncapital living expenses of 452 farm families enrolled in the Illinois Farm Business Farm Management Association (FBFM) averaged $34,336—or $2,861 a month for each family (Table 1). This average was 5.7 percent higher than in 1991 and 6.9 percent higher than in 1990. Another $4,745 was used to buy capital items such as the personal share of the family automobile, furniture, and household equipment. Thus, the grand total for living expenses averaged $39,081 for 1992 compared with $36,898 for 1991, or a $2,183 increase per family. The average amount spent per family for capital items was $327 more, while noncapital expenses increased $1,856 per family. The sample farms, which were mainly grain farms, were located primarily in central Illinois in a 15-county area bounded by Jacksonville, Peoria, Champaign, and Mattoon.

Figure 1 illustrates the annual capital and noncapital family living expenditures and income and social security tax payments for 1983 through 1992. Total family living expenses increased 4.75 percent annually during this period. Income and social security tax payments have increased during the latter 1980s and early 1990s due to improved farm earnings, elimination of investment tax credit, and an increase in the social security tax rate.

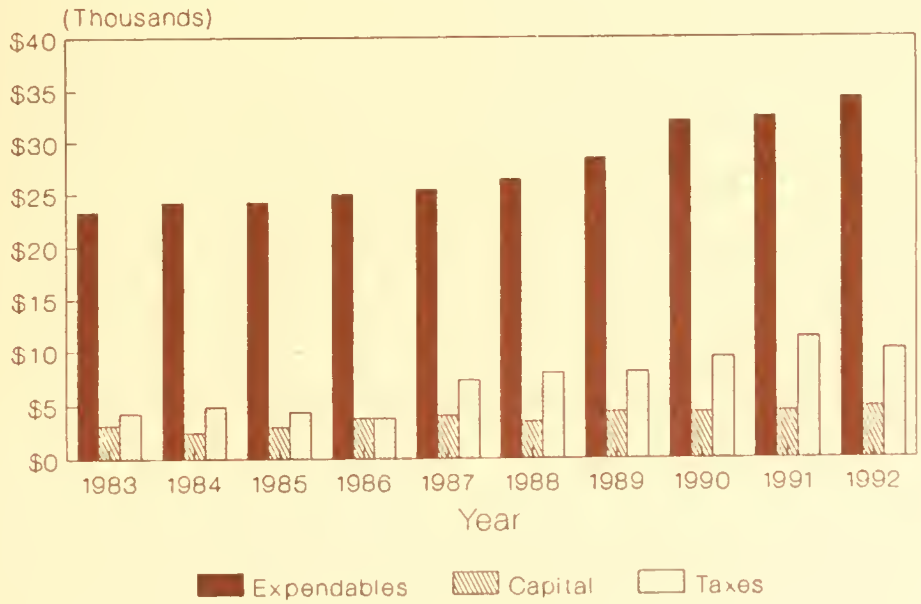

Figure 1. Noncapital and capital family living expenditures and income tax and social security payments, 1983–1992.

Table 1. Average Sources and Uses of Funds Over a Four-Year Period and by Noncapital Living Expenses for Selected Illinois Farms

	All records, average per farm				Family of 3 to 5, 1992[a]	
	1992	1991	1990	1989	High-Third	Low-Third
Number of farms in sample	452	456	408	402	94	94
Tillable acres farmed	755	731	719	709	943	639
Acres owned	132	131	120	119	149	110
Farm assets, January 1[b]	$426,539	$381,588	$358,394	$335,756	$517,932	$349,679
Farm assets, December 31[b]	450,722	383,283	384,363	355,420	549,902	370,201
Liabilities, January 1	218,402	198,764	183,161	175,939	309,592	173,931
Liabilities, December 31	229,076	202,708	203,168	182,841	339,448	177,736
Net farm income	55,759	30,596	50,825	45,047	69,859	45,141
Source of dollars						
Net nonfarm income	$ 12,166	$ 12,226	$ 12,624	$ 10,502	$ 11,289	$ 10,617
Money borrowed	144,676	118,446	116,122	90,394	258,791	92,795
Farm receipts	193,259	177,832	180,737	156,717	259,747	166,444
Uses of dollars						
Interest paid	$ 16,006	$ 15,550	$ 15,070	$ 13,850	$ 24,294	$ 12,564
Cash operating expenses	125,392	111,037	112,943	97,737	172,623	112,067
Capital farm purchases	19,867	22,829	27,834	18,299	25,366	16,261
Payments on principal	134,566	113,510	98,101	85,797	228,715	89,414
Income and Social Security taxes	10,172	11,326	9,444	8,040	11,280	7,574
Net new savings and investment	5,017	-2,646	9,710	1,070	13,028	4,411
Living expenses						
Contributions	$ 1,285	$ 1,271	$ 1,260	$ 1,198	$ 1,804	$ 795
Medical	5,022	4,675	4,381	3,853	6,227	3,598
Insurance, life and disability	2,431	2,268	2,227	2,149	2,932	1,390
Expendables	25,598	24,266	24,222	21,299	38,870	17,878
Total noncapital expense	(34,336)	(32,480)	(32,090)	(28,499)	(49,833)	(23,661)
Capital	4,745	4,418	4,291	4,321	4,688	3,904
Total living expenses	$39,081	$36,898	$ 36,381	$ 32,820	$ 54,521	$ 27,565
Percentage change, total noncapital living expenses	5.7	1.2	12.6	7.8		

[a]Records were sorted into high- and low-third categories according to total noncapital living expenses.
[b]Modified cost basis except bare land values were held at current values between January 1 and December 31.

Medical expenses averaged over $5,000 for the first time. Since 1988, medical expenses have increased $1,517 or 43 percent.

How these families use their funds depends somewhat on the levels of net income from farm and nonfarm sources and the priority of the expenditure. In this sample, the 1992 net farm income increased ($25,163 per farm) due to recordbreaking crop yields. Net nonfarm income, which has averaged over $12,000 for the past three years, decreased by $60 in 1992.

The amount of interest expense paid by each farm operator increased from $15,550 in 1991 to $16,006 in 1992. However, interest paid as a percentage of farm receipts decreased from 8.7 percent in 1991 to 8.3 percent in 1992. Higher gross returns resulted in the decrease in this percentage. The highest that this percentage has been during the decade of the 1980s was in 1983 when it was 15.3 percent. The lowest it has been was in 1988 when it was 7.9 percent. As a percentage of cash operating expenses, the interest paid decreased from 12.3 percent in 1991 to 11.3 percent in 1992. Cash farm receipts were $256 per tillable acre, an increase of $13 per tillable acre. They were at their highest level in 1987 when they were $265 per tillable acre. Cash operating expenses, including interest, increased $14 per tillable acre. Machinery and building purchases decreased from $22,829 in 1991 to $19,867 in 1992.

Debt-to-Asset Ratio Decreases

The sample of farms showed an average debt of 51 cents for each $1 of farm assets as of December 31, 1992; machinery was valued at cost less depreciation. The debt for each $1 of assets was 53 cents on December 31, 1991. Both the value of farm assets and the amount of debt increased as compared to the previous year. This debt-to-asset ratio would be lower if machinery were valued at a current market value. Including nonfarm assets would also lower the ratio.

The farms in this sample were 54 acres larger than the average for the 7,200 farms in the FBFM record-keeping program. Crop yields averaged about 5 percent above those reported by the Illinois Crop Reporting Service. Operator's farm income from this sample of farms was slightly higher than the average of all Illinois record-keeping farms. The average operator's net farm income of all Illinois record-keeping farms was $54,035, or $1,724 less than the average net farm income for this sample. The average living expenditures for farms in this sample are estimated to be 15 to 20 percent above the average of all Illinois farm operators having more than $40,000 gross sales per farm; this is because the average net farm income for this sample is usually higher than the average for all farms.

In 1992 the average operator of these 452 farms was 45 years old. The family averaged 3.6 members, with the oldest dependent child averaging 10 years. The average operator farmed 755 tillable acres, of which 132 acres, or 17 percent, was owned by the operator. The operators kept records so that all sources of funds, both farm and nonfarm, balanced with all uses of funds in a complete monthly cash-flow accounting system.

In Table 1, the averages per farm for total family living expenses are divided into five categories for 1989 through 1992. The "expendables" category includes cash spent for food, operating expenses, clothing, personal items, recreation, entertainment, education, and transportation. This category also includes selected itemized deductions such as the personal share of real-estate taxes. Cash spent for capital improvements exceeding $250 is not included. The use of a rented house on an estimated 40 to 50 percent of the farms in this sample is not included, because these data cover only cash outlays.

Noncapital living expenditures per tillable acre increased $1 to $45 per tillable acre. During the last decade, noncapital living expenditures have varied from $37 to $45 per tillable acre. The excess on nonfarm taxable income over nonfarm business expense was $12,166 in 1992 or 31 percent of the total living expense; in 1991, the excess was 33 percent. It includes dividends on stocks, interest on savings and money-market funds, income from other nonfarm investments, and income from off-farm employment performed by family members. Interest earned and left in savings accounts not included in the cash flow is not reflected in the nonfarm income.

Assets, Liabilities Increase

The value of farm assets and the amount of liabilities for this sample of 452 farms increased when compared to a year earlier. The value of farm assets on December 31, 1992, was $67,439 more than a year earlier. The increase reflects higher values in grain inventories. Land values would have increased slightly. At the same time, liabilities also increased by $26,368. These farms borrowed $10,110 more than they made in principal payments for the year. In 1991, the amount borrowed exceeded principal payments by $4,936. The $19,867, or $26 per tillable acre, spent on capital purchases for machinery and equipment was $13 and $5 per tillable acre less than what was spent in 1990 and 1991, respectively.

Although less than earlier years in the 1980s, interest payments continue to be one of the highest farm expense items. The amount of interest paid in 1992 increased compared to 1991. Interest includes that paid on operating, intermediate, and real-estate debt. Interest paid increased from 12 percent of total farm operating expense in 1979 to 21 percent in 1983 and dropped to 11 percent in 1992. The $16,006 interest payment in 1992 was 8.3 percent of total cash farm receipts, down from 8.7 percent in 1991.

High-Third/Low-Third Comparison

The records from farm families with three to five persons were sorted into two categories, the high-third and the low-third, according to their noncapital living expenses. The total living expenses for the high-third group averaged $54,521, compared with $27,565 for the low-third group. Figure 2 illustrates total living expenses for these two groups for 1985 through 1992. The high-third group farmed 304 more acres than the other group and owned 16 percent of the land farmed; the low-third group owned 17 percent of the land farmed. The larger farms in the first group had more income for living expenses and to pay income tax. Net farm plus nonfarm income was $81,148 for the high-third group, compared with $55,758 for the low-third group. The average age of operators in the high-third group was 42 and the number of family members was 4.2 compared with 40 years of age and 3.9 family members for the other group. Subtracting total living expenses and income and social security taxes paid from the total of net farm and nonfarm income results in a positive balance of $15,347 for the high-third group and $20,619 for the low-third group. Figure 3 illustrates this balance for these two groups for 1985 through 1992. It is interesting to note that although the low-third group had less income than the high-third group, they had more funds remaining after family living and tax expenditures.

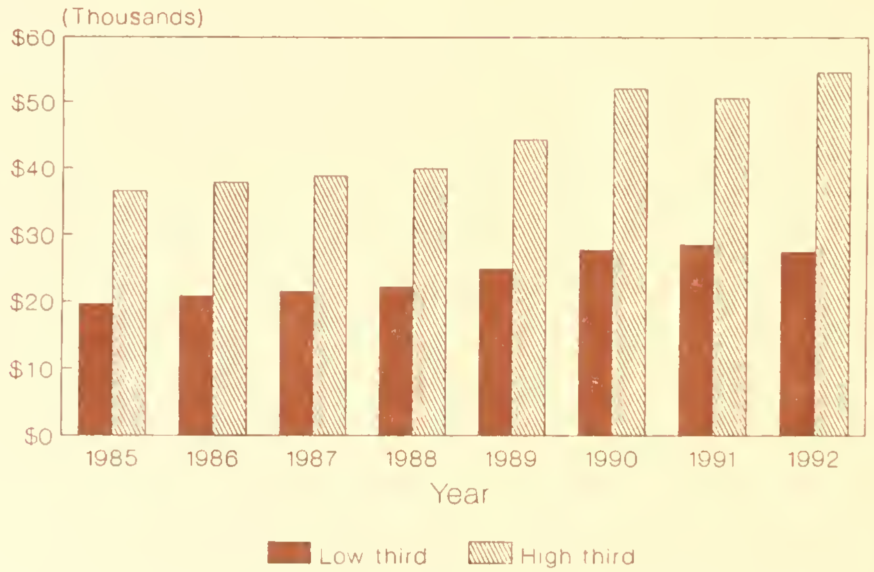

Figure 2. Total family living expenditures for families with three to five persons sorted into high-third and low-third according to noncapital living expenses, 1985–1992.

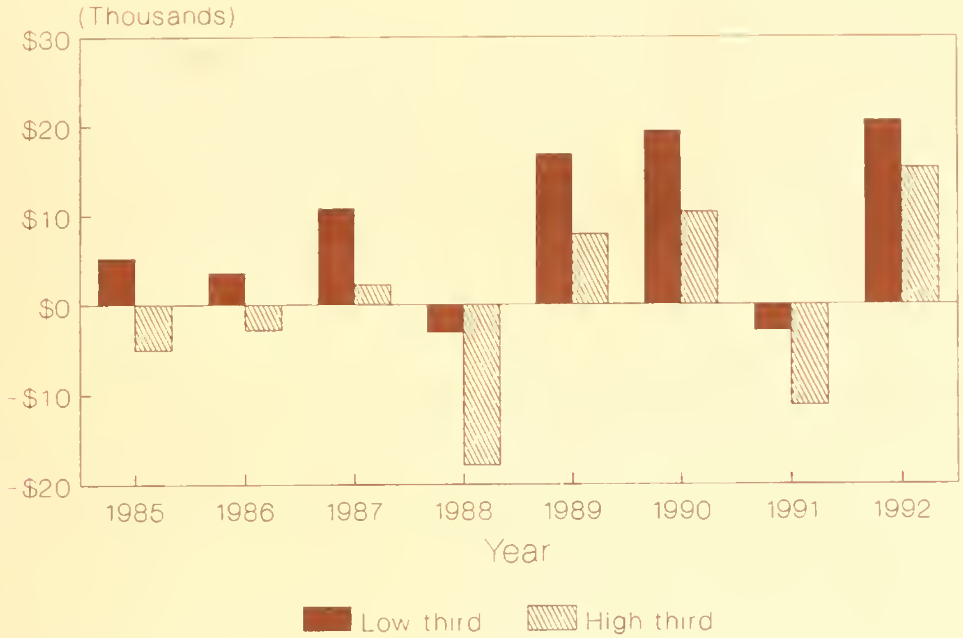

Figure 3. Average of net farm and nonfarm income less total family living expenses and income and social security taxes paid, sorted into high-third and low-third according to noncapital living expenses, 1985–1992.

Farm operations continue to grow in size. As these operations expand, more funds are flowing in and out of the business. More lenders are requiring cash-flow projections and continual monitoring of these projections. It is, therefore, important that more farmers learn how to balance and monitor cash flow each month. Computer program assistance is now becoming available in more service centers such as most FBFM Association district offices. These centers are prepared to offer services to help farmers project monthly cash flow on computer printouts so that they can compare projections with their actual results. Increased use of microcomputers for farm accounting purposes should also assist more farm operators to account for all funds.

For the farm operators with low equity or very high debt-to-asset ratios, this type of accounting is essential. These operators need to account for all of their sources and uses of funds to assist them in making sound financial management decisions.

The data summarized in this process may also serve as a guide in budgeting allowances for family living expenses. For families in this sample, the family living expenses averaged $52 for each tillable acre farmed. If the net nonfarm income of $16 per tillable acre is used for living expenses, $36 per tillable acre would have to be generated from the farm business to meet family living requirements. Since 1983, this amount has varied only $7 per tillable acre, ranging from $29 to $36. Each family must determine how much each acre of crop or each litter of hogs should contribute to their family living expenses. This amount, when added to production costs and other obligations, can help to determine the break-even prices they need for the products they sell.

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Certified Farmland Assessed Values Up 10 Percent for 1994

The 1994 certified farmland assessed values, issued in May 1993 to county assessing officers, are up 10 percent for all soil productivity indexes over the values certified in 1993. After more than four years of steadily declining certified assessed values for farmland, these values have increased for three consecutive assessment years (1992, 1993, and 1994). Because the farm economy performed poorly in the early and mid-1980s, as evidenced by weak commodity prices and high interest rates, there was significant downward pressure on certified assessed values for farmland through 1990. The strengthened economic conditions in Illinois agriculture in recent years (that is, relatively higher commodity prices and relatively lower interest rates) are putting significant upward pressure on farmland assessments and will continue to do so for several years.

Farmland certified assessed values are issued by the Illinois Department of Revenue each spring to county assessing officials. Assessing officials use these values to determine the taxable value of farms on the following January 1.

Relatively higher commodity prices combined with lower interest rates to put upward pressure on farmland certified assessed values again in 1994. The 1994 values, like the 1993 certified values, were limited in their increase to 10 percent by the 10 percent limit law. This law, passed in 1986, restricts the change in certified values to 10 percent from one year to the next. Its purpose is to partially insulate the tax bases of rural schools and other local governments from a poorly performing farm sector and consequent dramatic drops in farmland assessments. It also insulates farm property taxpayers from significant assessment increases caused by substantial changes in key economic variables such as interest rates and commodity prices.

1994 Certified Assessed Values by Soil Productivity Index

The per-acre certified assessed values for cropland that assessing officers will use to determine the 1994 assessed value of farmland throughout Illinois are shown in Table 1. For comparison, 1993 certified values are also presented. The 1994 assessed values on farms will be the base for taxes paid by farm owners in 1995. The index ranges from 60 to 130, and the 1994 certified values range from $9.77 per acre to $355.16 per acre. The assessor applies the appropriate certified value in calculating the taxable value of farmland in each farm tax parcel after determining the soil index for the parcel and the use of the land in farming. The farmland assessment is added to assessments for buildings, building site, home, and home site to get the total taxable value on each farm parcel.

The certified values for 1994 in Table 1 are 110 percent of the values certified in 1993 because the assessed values calculated with the income capitalization formula required by the Illinois Farmland Assessment Law were more than 110 percent of the 1993 values. The 10 percent limit law required the certification of values that increased by no more than 10 percent from the 1993 certified values.

Table 1. 1992 and 1993 Certified Farmland Equalized Assessed Values (EAV) by Soil Productivity Index

Productivity index (average management)[a]	1993 certified EAV[b]	1994 certified EAV[b]	Productivity index (average management)[a]	1993 certified EAV[b]	1994 certified EAV[b]
	--------dollars per acre--------			*-------dollars per acre--------*	
60	8.88	9.77	96	113.18	124.50
61	9.60	10.57	97	118.60	130.46
62	10.35	11.38	98	124.12	136.53
63	11.06	12.17	99	129.72	142.70
64	11.78	12.96	100	135.36	148.89
65	12.50	13.75	101	141.10	155.21
66	13.23	14.56	102	146.90	161.60
67	13.95	15.35	103	152.72	168.00
68	14.67	16.15	104	158.64	174.51
69	15.39	16.93	105	164.65	181.11
70	16.12	17.73	106	171.16	188.27
71	16.83	18.51	107	178.39	196.23
72	19.91	21.89	108	185.64	204.20
73	22.98	25.28	109	192.87	212.16
74	26.04	28.64	110	200.11	220.12
75	29.11	32.01	111	207.35	228.08
76	32.16	35.38	112	214.58	236.04
77	25.23	38.76	113	221.80	243.99
78	38.28	42.11	114	229.04	251.94
79	41.35	45.48	115	236.27	259.89
80	44.42	48.86	116	243.52	267.86
81	37.38	52.23	117	250.74	275.82
82	50.55	55.60	118	257.97	283.77
83	53.59	58.95	119	265.22	291.74
84	56.67	62.34	120	270.71	297.78
85	59.74	65.71	121	275.74	303.32
86	62.79	69.07	122	280.83	308.90
87	67.08	73.79	123	285.96	314.54
88	71.95	79.14	124	291.12	320.19
89	76.81	84.49	125	296.27	325.91
90	81.83	90.02	126	301.50	331.67
91	86.91	95.61	127	306.80	337.47
92	92.00	101.21	128	312.12	343.33
93	97.20	106.92	129	317.46	349.22
94	102.43	112.67	130	322.86	355.16
95	107.79	118.55			

Source: Illinois Department of Revenue, Certification Memos, 1993 and 1994.

[a]Average management productivity index is the average of the basic and the high-level management indexes as reported in *Soil Productivity in Illinois*, Illinois Cooperative Extension Service Circular 1156, 1978.

[b] 1993 values are 110 percent of 1992 certified values, and 1994 values are 100 percent of 1993 certified values.

The Income Capitalization Formula

The income capitalization formula required by the Illinois Farmland Assessment Law is:

$$\text{Value} = \frac{\text{gross income per acre less per-acre nonland production costs}}{\text{average Farm Credit Service mortgage interest rate}}$$

The formula uses five-year-average data to calculate the per-acre certified assessed value for cropland. There is a two-year lag between the assessment year and the last year of the data used in the calculations. For example, the 1994 calculations, which had to be completed before May 1993, used data averaged over 1988 to 1992. Lags in data used for the mass appraisal of property for tax purposes are very common. Because income and costs vary by soil quality, a separate calculation is done for each soil productivity index.

Note the arithmetic of the income capitalization formula:

- a higher (lower) gross income caused by higher (lower) crop prices increases (decreases) the value;
- lower (higher) nonland production costs increase (decrease) the value; and
- a lower (higher) average mortgage interest rate from the Farm Credit Service increases (decreases) the value.

It is relatively easy, from the arithmetic of the formula, to identify the general impact that changes in commodity prices and interest rates have on certified farmland assessed values. For example, certified farmland assessed values are directly related to crop prices and indirectly related to production costs and interest rates.

Why Did Certified Assessed Values Increase Again in 1994?

Higher commodity prices and lower interest rates continued to put upward pressure on the certified values in 1994. Commodity prices are one of the major factors influencing the calculation of certified values. The relationship between commodity prices and calculated certified assessed values on farmland is direct; higher prices cause higher calculated values and lower prices cause lower calculated values.

The commodity prices for 1976 through 1992 are presented in Table 2. The five-year average prices used in the computation of farmland certified assessed values are calculated from these prices. For example, the average price for the 1994 assessment calculation is the average price for 1988 through 1992. For corn, this is \$2.41; for soybeans, it is \$6.26.

Table 2. Illinois Commodity Price Summary, Calendar Years 1976 to 1992

Year	Corn	Soybeans	Wheat	Oats
	------*(dollars per bu)*[a]------			
1976	2.54	5.65	2.98	1.44
1977	2.07	6.84	2.19	1.32
1978	2.12	6.32	2.93	1.28
1979	2.43	6.96	3.75	1.43
1980	2.78	6.90	4.02	1.58
1981	2.99	7.03	3.79	1.99
1982	2.43	5.88	3.12	1.92
1983	3.04	6.86	3.36	1.95
1984	3.13	7.14	3.34	1.81
1985	2.53	5.53	3.17	1.70
1986	2.00	5.09	2.80	1.26
1987	1.61	5.16	2.69	1.67
1988	2.32	7.28	3.41	2.30
1989	2.49	6.74	3.99	1.92
1990	2.46	5.92	3.09	1.29
1991	2.42	5.72	2.72	1.20
1992	2.34	5.64	3.34	1.53

SOURCE: Illinois Crop Reporting Service.
[a]Price used in farmland assessment computations.

Figures 1 and 2 present the five-year average prices used in the assessment calculations for 1981 through 1994. Figure 1 shows average corn prices by assessment year, and Figure 2 shows average soybean prices by assessment year. The decline in average prices that began in 1986 put downward pressure on the calculated assessed values. With the leveling of average prices in assessment year 1991 and upward price movements since then, calculated assessed values have been pressured up by stronger five-year-average commodity prices.

Reviewing the prices in 1988 for corn and soybeans that will be replaced by 1993 prices in the 1995 assessment calculations suggests the upward pressure on assessments from higher five-year-average commodity prices will be relaxed somewhat for 1995.

Another major determinant of the certified assessed values is the five-year-average mortgage interest rate from the Farm Credit Service. This rate is used as the capitalization factor in the formula. There is an inverse relationship between the capitalization factor and the calculated assessed values; a higher interest rate results in lower calculated assessed values and a lower interest rate results in higher calculated assessed values. The five-year-average interest rates by assessment year are presented in Figure 3.

Beginning with assessment year 1981, the interest rates increased steadily through assessment year 1988. Higher interest rates combined with weak commodity prices to put substantial downward pressure on the calculated assessed values. However, with the 1989 assessment year, lower interest rates began to put upward pressure on the values. Beginning in assessment year 1992, stronger five-year-average commodity prices combined with lower five-year average mortgage interest rates from the Farm Credit Service to put significant upward pressure on calculated assessed values for farmland. The upward pressure was great enough to trigger the 10 percent limit law restricting the increase in certified values to 10 percent from 1992 to 1993. The increase was also limited to 10 percent in 1994 as stronger prices and lower interest rates combined with increases from 1992 and 1993 assessment years not yet included in certified values drove the 1994 calculated values above 1993 certified values by substantially more than 10 percent.

Farmland Assessments for the Rest of the 1990s

Increases can be expected in certified assessed values for farmland for most of the remainder of the 1990s. Remember, the values in Table 1 are for assessment year 1994. The 10 percent limit law restricted the increase in certified assessed values in 1992, 1993, and 1994. Thus, all of the increases from those three years that are related to higher prices and lower interest rates have yet to be completely reflected in assessed values certified to local assessing officials. And the likely continued upward pressure on calculated values from lower five-year-average mortgage interest rates from the Farm Credit Service suggests the 10 percent limit law will restrict the upward movement in certified values for maybe two or three more years. This situation suggests upward pressure on farm assessments for much of the rest of the 1990s as the stronger underlying fundamental economic conditions are slowly incorporated into the certified values.

Figure 4 traces the certified and calculated assessed value for a soil with an index of 120 from assessment year 1981 through assessment year 1994, with some projection through assessment year 1996. Between 1981 and 1986, the certified value was equal to the calculated value. The 1986 limit law changed this. Beginning in 1987, the certified value was greater than the calculated value through 1990 assessments as the 10 percent limit law restricted the decline from one year to the next to 10 percent. For this soil, the calculated and certified values were identical or very close in 1991 and 1992. Because of stronger commodity prices and lower interest rates, the calculated values in 1993 and in 1994 are above the certified values. The 10 percent limit law is working on the up side, limiting the increase between 1992 and 1993 to 10 percent and the increase between 1993 and 1994 to 10 percent.

Projections for assessment years 1995 and 1996 show the certified value lying below the calculated value in each year. Even with stable five-year-average prices and interest rates, this would be expected as increases from prior assessment years are accommodated in these certified values. With continued downward pressure on the five-year-average mortgage interest rate from the Farm Credit Service, the calculated value trend line may not cross the

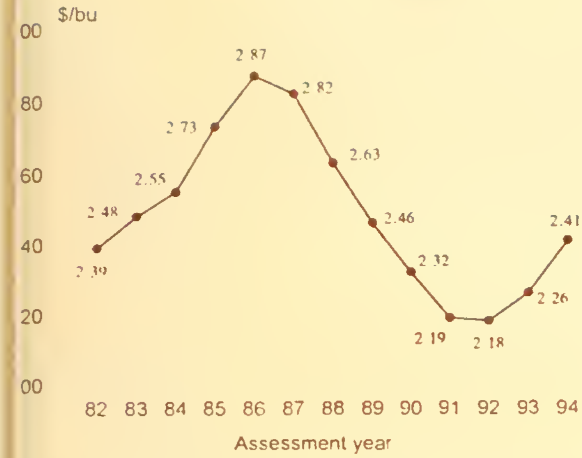

Figure 1. Average corn price for assessments.

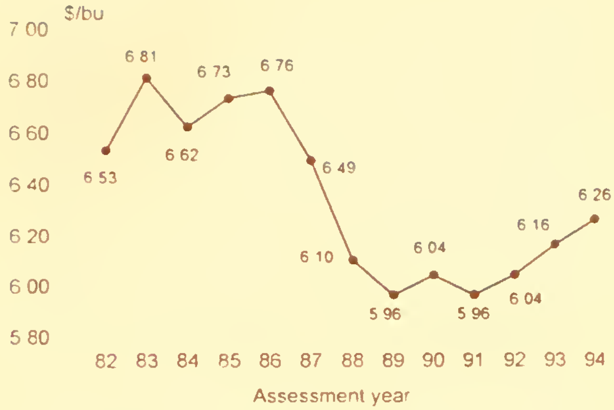

Figure 2. Average soybean price for assessment.

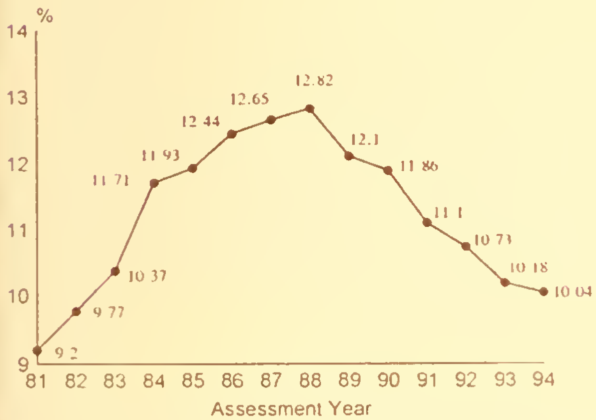

Figure 3. Farmland assessment capitalization rates.

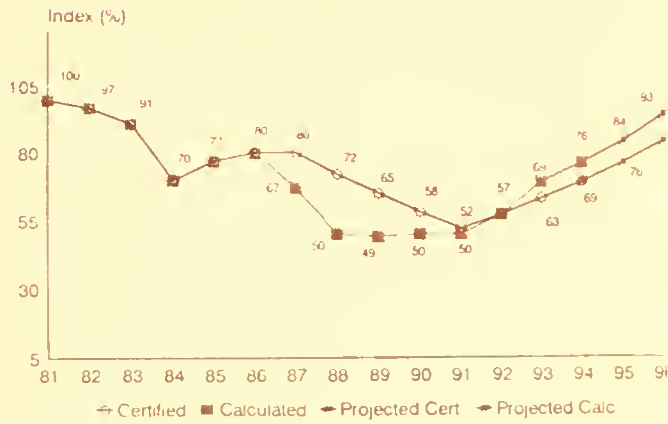

Figure 4. Index of certified and calculated assessed values for soils with a productivity index of 120, 1981 to 1994, with projections for 1995 and 1996.

certified value trend line until close to or after assessment year 2000. Current declines in interest rates will affect the assessment calculations for assessment year 1995 through assessment year 1999. Of course, very dramatic changes in the underlying economic fundamentals could drastically change this projection. However, with the fundamentals remaining near current trends, upward movement in certified assessed values on farmland at or close to 10 percent per year can be expected for the next several assessment years.

What about Future Property Tax Bills?

Higher certified assessed values on farmland are welcomed by rural school boards, townships, and county governments and are disturbing to farmland property taxpayers. A 10 percent increase in certified values for 1994 does not have to translate into a comparable increase in tax bills payable in 1995. Only the budgeting process of schools and other local governments will determine the impact of stronger farmland assessed valuations on farm property tax bills. However, history suggests property tax bills are very, very sticky downward when assessments are declining and very, very robust upward when assessments are increasing. There is new evidence of this phenomenon with the average per-acre taxes paid in 1992 by Illinois farmland owners. The average per-acre tax payment increased 15 percent in 1992 to a record level of $16.66. The 1992 payments, based on slightly stronger 1991 assessments, suggest there was no offsetting reduction in average property tax rates. The outcome was a substantial growth in the 1992 average per-acre tax payment to a historical high. When data on 1993 payments become available, expectations are for even higher record-setting average per-acre taxes.

Taxpayer involvement in the budgeting process of taxing bodies would seem to be prudent in the upcoming budget years in order to temper the impact of higher farmland assessed values on farm property tax bills. Remember, the local government and the local school spending that is financed by property taxes drives the level of property taxes in any area. The assessment system simply distributes the cost of this spending among property owners according to the relative assessed valuation of their property.

For several years, the 10 percent limit law held certified assessed values on farmland above their level prescribed by underlying economic conditions. Now, particularly with declining interest rates, the 10 percent limit law will hold certified assessed values below where they would otherwise be. Just as it took several years for the farm recession of the 1980s to be worked into the Illinois farm property tax base, it will take several years for the stronger fundamentals to be incorporated into higher farmland assessed values. As was the intention of the 1981 Illinois Farmland Assessment Law, the assessed value on farmland, in a general sense, is reflecting the underlying aggregate economic conditions of Illinois agriculture, tempered by the 10 percent limit law, which provides some stability for both taxing districts and farmland property taxpayers.

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FARM ECONOMICS Facts & Opinions

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Farm Property Taxes Increase in 1992 to Historical High

Property tax reforms continue center stage in discussions on Illinois state and local government finance in general and on school finance in particular. While there is general agreement that reform is important and necessary to balance the public finance system in Illinois, there is little consensus on exactly what steps should be taken. Discussions on how to reduce the heavy reliance on the property tax to finance local schools continue with no consensus on an acceptable alternative. Lowering this reliance requires significant increases in state tax rates (that is, the income and/or sales tax rates). Any general state tax increase faces political resistance. However, the eventual likelihood of increased state taxes appears to be high so that both tax reform and the overall weak fiscal position of state government can be addressed.

Information about the Illinois property tax and the state/local government finance system is very important in property tax reform debates. The average per-acre tax paid on Illinois grain farms, 1976 through 1992, is presented in Figures 1, 2, and 3. These figures provide an excellent historical view of farm property taxes in Illinois. Figure 4 presents per acre farm property taxes for each state in the United States for 1991 (the most current data available), making comparisons between Illinois and other states possible.

The average per-acre tax paid on Illinois grain farms was virtually the same in 1988, 1989, and 1990 ($14.98, $14.99, and $15.01, respectively). The average payment in 1991 was slightly lower at $14.44. The average payment in 1992 was up $2.22 per acre from the average 1991 payment to a record high of $16.66. This is an increase of over 15 percent. The 1992 per-acre average payment is roughly $1.00 per-acre above the previous peak payment of $15.75 experienced in 1983. The increase in 1992 reverses almost a decade of steady to declining average per-acre property tax payments.

The 1992 average per-acre tax is based on 1991 assessments and was used to finance local government spending, including schools, in fiscal year 1993. Of course, property taxes are the outcome of multiplying the assessed valuation of property by the property tax rate. The tax is the residual budget-balancing revenue source for schools and other local governments. Higher farmland assessments in 1991 plus upward pressure on tax rates from rural schools and other local governments pushed the average per-acre payment up in 1992 to an all-time high of $16.66.

It is widely recognized that the poor economic conditions in Illinois agriculture pushed farmland assessments down in assessment years 1987 through 1990. In 1991, assessments strengthened somewhat. To experience the type of average per-acre property tax payments presented in Figure 1 for 1988 through 1991, there had to be significant upward pressure on the average farm property tax rate (outside of Cook County). The combination of upward pressure on rates and the strengthened 1991 assessments resulted in a growth in the average per-acre payment of $2.22 in 1992 and an historically high average per-acre farm property tax payment. With farmland assessments continuing to strengthen in assessment years 1992, 1993, 1994, 1995, and 1996 (up an

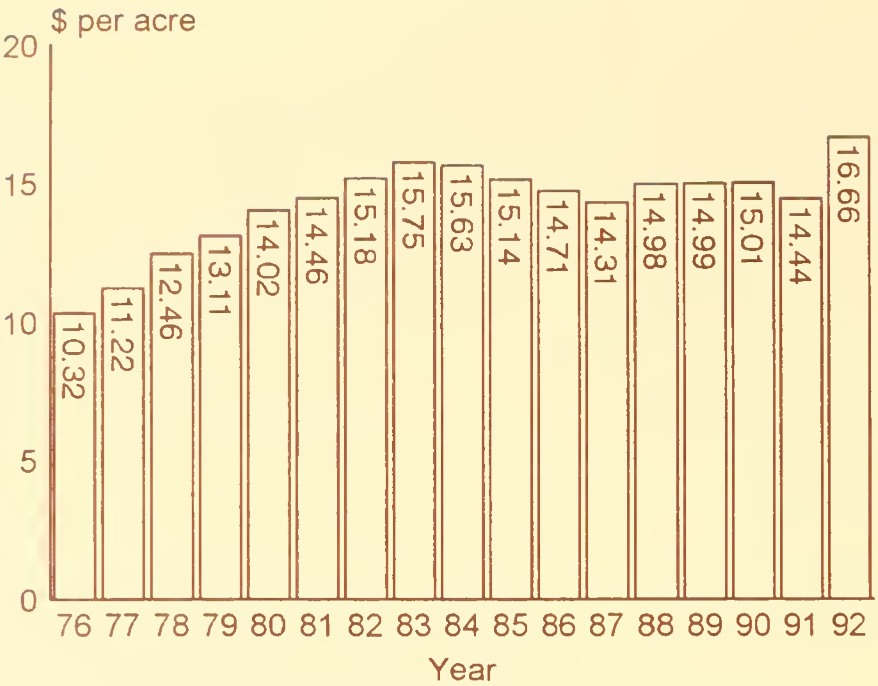


Figure 1. Per-acre property taxes on Illinois grain farms, 1976 to 1992.

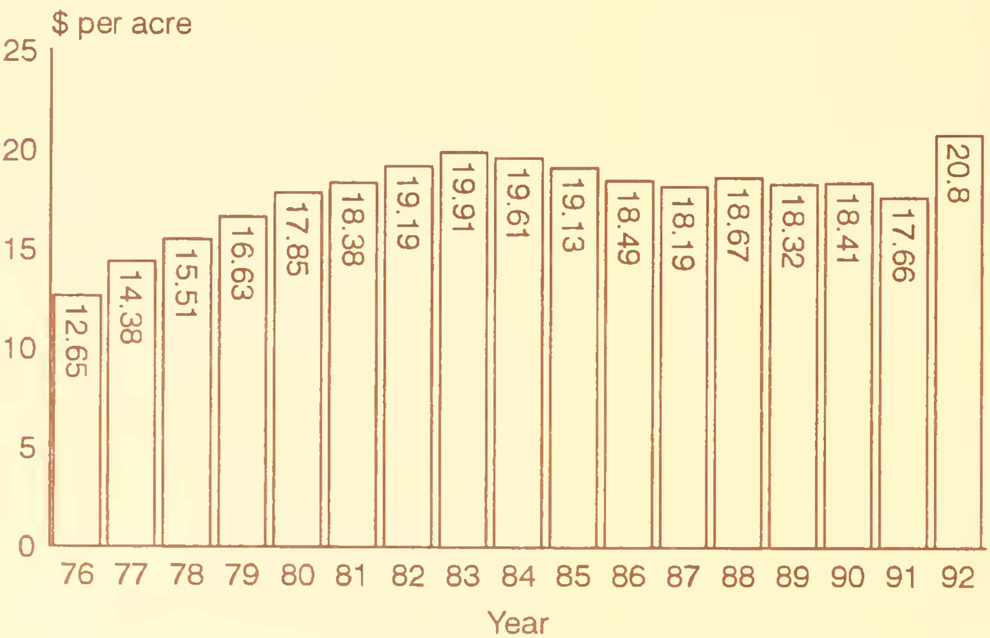


Figure 2. Per-acre property taxes on northern and central Illinois grain farms, 1976 to 1992.

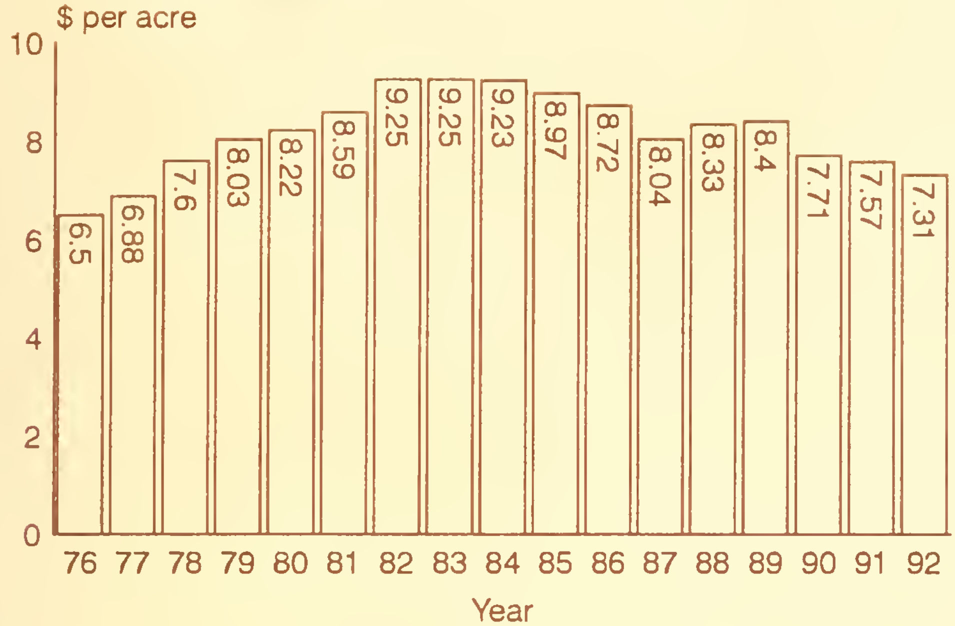
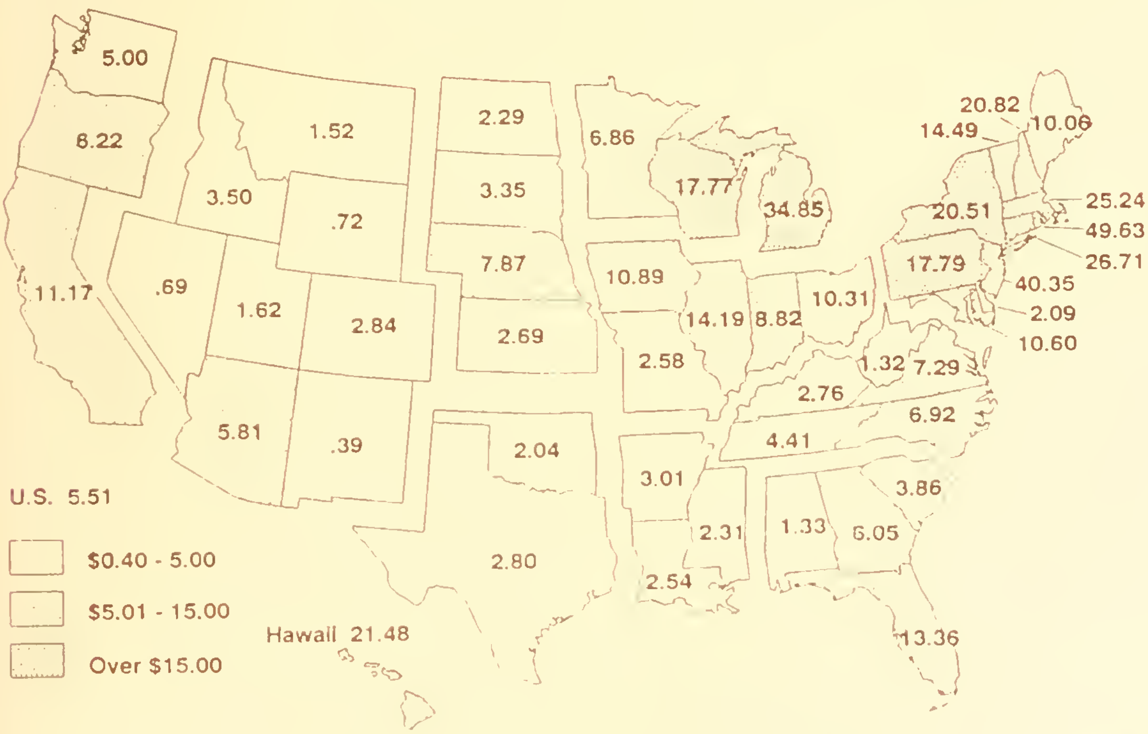


Figure 3. Per-acre property taxes on southern Illinois grain farms, 1976 to 1992.



SOURCE: ERS, USDA, *Agricultural Resources* AR-31, Washington, D.C. (June 1993):24.

Figure 4. Average per-acre agricultural real estate taxes, 1991.

average of 10 percent each year), significant upward pressure on average per-acre tax payments can be expected for taxes paid in 1993 and payable in 1994, 1995, 1996, and 1997 unless schools and other taxing bodies implement offsetting reductions in their property tax rates. However, this is not likely because property tax rates have been shown to be very, very sticky downward.

Per-Acre Taxes Across the State

Figure 1 shows per-acre property taxes for a sample of Illinois grain farms from 1976 to 1992. Data for the sample in the 68 northern and central Illinois counties and the 34 southern Illinois counties are also included in Figures 2 and 3. In 1992, the sample included 1,964 grain farms, totaling 1.71 million acres. In 1992, average per-acre taxes on southern Illinois grain farms were 44 percent of the state average. Average per-acre taxes on northern and central Illinois grain farms were roughly 118 percent of the state average. Per-acre tax payments in the southern Illinois counties in 1992 showed little change from 1991 average payments, while per-acre payments in the northern and central Illinois counties increased about 19 percent. The increase in 1992 in average per-acre payments for the state was driven entirely by the increase in the northern and central Illinois counties.

The historical difference in the level of per-acre property taxes in the two regions of Illinois reflects the less productive soils in southern Illinois compared to the other regions of the state; this difference results in lower farmland assessed valuations. Generally, farm property tax rates are lower in southern Illinois as well. In 1992, these differences resulted in an average of $20.80 per-acre average tax in northern and central Illinois and a $7.31 per-acre average tax in southern Illinois.

Farm Property Taxes in Illinois and Other States

Figure 4 maps the average per-acre farm property tax payments for the 48 continental states in 1991. Published in 1993, the 1991 data are the most current figures available to compare the level of farm property taxes in these states. The statistic for Illinois on the map is a little different from the 1991 statistic in Figure 1 because the source of the information used by the USDA is different from the source used to compile Figure 1. The difference, however, is not significant.

Per-acre property taxes on farmland are highest in the eastern states. Among the midwestern states, Illinois ranks behind Wisconsin and Michigan in per-acre payments. Both Wisconsin and Michigan have circuit breaker programs for farm property taxpayers in which the state pays a portion of the property tax bill, depending on the income of the taxpayer. Accordingly, the figures for these two states are "gross" per-acre taxes unadjusted for the part paid by the state through the circuit breaker program. The "net" or actual average per-acre farm property tax payment is less than the figures in the map.

Excluding the circuit breaker states of Wisconsin and Michigan and the highly urban eastern states, Illinois has the highest average per-acre farm property tax payments in the United States. A major factor determining the level of property taxation, in general, and the level of farm property taxation, in particular, is the dependence of local school systems on property taxes as a revenue source. Because Illinois depends rather heavily on the property tax to fund local schools, the relatively high per-acre farm tax levels in Illinois are not surprising. The dependence on the property tax for school funding is a major issue in the debate on tax reform in Illinois.

Effective Tax Rates and Tax Payments

The **effective** property tax rate is the ratio of property taxes paid to the market value of farmland. It is one of the better methods for measuring the property tax burden on Illinois farms. High effective rates or increasing effective rates indicate a high property tax burden or an increasing burden, respectively. Table 1 shows the effective rates for the last 17 years for Illinois and the northern and southern regions of the state. The effective rate in 1992 for Illinois was 0.97, up from the 1991 rate of 0.89. The declining farm property tax burden, which began in 1988 and continued through 1991, is now reversing itself. The strengthened market values on farmland were outpaced by

Table 1. Effective Property Tax Rates on Illinois farms, 1976 to 1992

Tax year	Effective tax rate, percent[a]		
	Northern Illinois	Southern Illinois	Illinois
1976	1.02	0.88	0.96
1977	0.93	0.75	0.86
1978	0.74	0.62	0.72
1979	0.72	0.59	0.68
1980	0.69	0.54	0.65
1981	0.60	0.49	0.56
1982	0.58	0.51	0.56
1983	0.66	0.56	0.64
1984	0.85	0.72	0.82
1985	0.99	0.84	0.95
1986	1.11	0.94	1.07
1987	1.31	0.92	1.20
1988	1.14	0.89	1.08
1989	1.02	0.82	0.97
1990	0.99	0.73	0.94
1991	0.94	0.71	0.89
1992	1.05	0.66	0.97

[a]The effective tax rate is the ratio of property taxes to the market value of farmland, computed using only grain farms.

the growth in property tax payments in 1992, resulting in an increase in the Illinois farm property tax burden. The burden increased approximately 9 percent from 1991 to 1992.

The solid line in Figure 5 is an index of average per-acre property tax payments by Illinois grain farm owners. This line shows a steady increase in per-acre tax payments from 1976 through 1983, a decline from 1983 to 1987, an increase between 1987 and 1988, roughly a steady state for 1988 through 1991, and a significant increase in 1992. The steady state for 1988 through 1991 was the result of ever-increasing property tax rates to offset the weak farmland assessments of 1987 through 1990, the basis for tax payments in 1988 through 1991. With stronger assessments in 1991 and upward pressure on tax rates, the index of property taxes shot up to an historical high of 148.5 in 1992 (1977 = 100). Similarly, the index of effective tax rates increased in 1992. The tax burden represented by this measure is approximately equal to the burden experienced in 1989, but below the record-level burden experienced in 1987 (1987 index = 139.5; 1992 index = 112.8).

Summary

Average per-acre property tax payments on Illinois grain farms increased in 1992 to an historical high of $16.66. Changes in tax rates combined with higher farmland assessments to push per-acre average payments above the previous peak of $15.75 in 1983. This combination reversed nearly a decade of steady-to-declining nominal average per-acre property tax payments by Illinois farmland owners. Comparisons of the effective tax rate and the average per-acre tax payment indicate an increase in the "farmland tax burden" in 1992. Strengthened farmland assessed values in 1992, 1993, and 1994, which are expected to continue to increase in 1995, 1996, and 1997, suggest significant continued upward pressure on average payments, close to if not exceeding 10 percent each year through 1999. Each year will set a new historical high in average per-acre farmland property taxes unless property tax rates, particularly school rates, are relaxed.

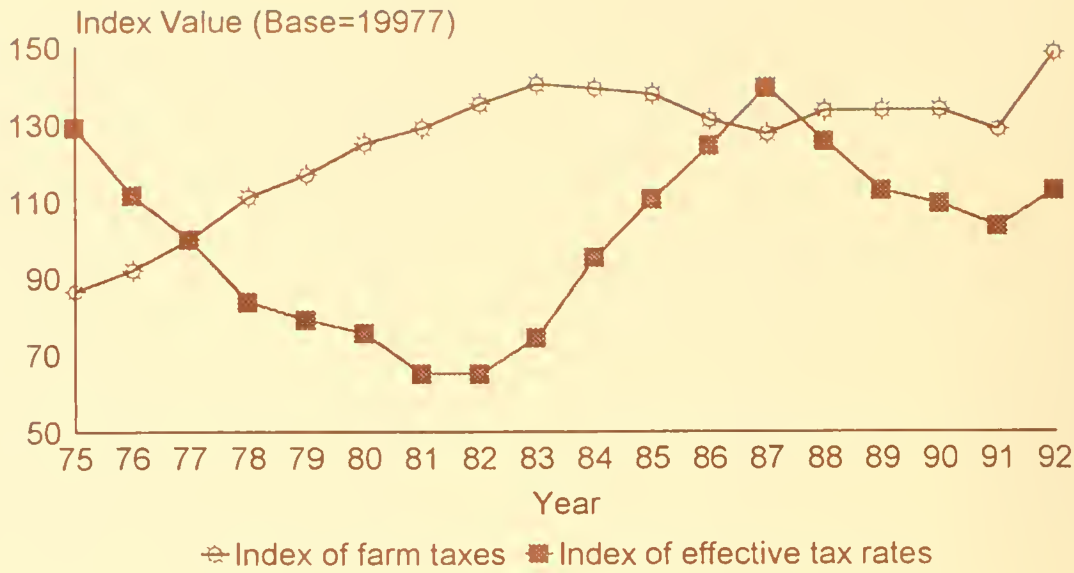


Figure 5. Index of per-acre property taxes and effective farm property tax rates, 1975 to 1992.

Heavy reliance on property taxes to fund Illinois schools places per-acre farm property taxes in Illinois among the highest in the United States among states with a significant agricultural sector.

Understanding the dynamics of the Illinois farm property tax is not a trivial undertaking. Figure 5 clearly illustrates the important interaction between economic forces that drive farmland assessments and market values and spending by rural schools and other local governments that drive property tax rates in determining farm property tax levels and burdens in Illinois. As a strengthened farm economy is integrated into the factors that determine farmland assessments, per-acre property tax payments will increase unless there are corresponding offsets in property tax rates. Lower property tax rates are highly unlikely.

Future increases in the farm property tax burden, which began in 1992, will intensify pressures from the agricultural sector for property tax reform. The demands for reform will probably be manifested in ever louder calls for lower dependence on the property tax for financing rural schools and an increased financial role for state government. With the continued weak fiscal position of Illinois's state government, shifting the funding for local schools to state government is out of the question without increases in one or both of the state's major revenue sources, the sales tax and the income tax.

Balancing the Illinois tax system presents a significant challenge to members of the General Assembly and the governor of Illinois. However, understanding the complexities and dynamics of the farm property tax system will yield significant dividends as current tax policies are assessed and alternatives are considered. The task is a major one, but the benefits of a more balanced Illinois state and local tax system will be significant and long-lasting.

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Hidden Discounts in Grain and the Incentive for Rewetting

Farmers know that quality defects in their corn and soybeans will lower the price they receive for their grain, but few farmers recognize that they can also receive a discount for delivering top-quality grain. This "hidden discount" is often greater than the discounts for damage, foreign material, or excess moisture. Whenever a farmer delivers grain at a moisture level below the base set by the market, he has lost weight that could have been sold at the price of corn or soybeans. Although corn stored at moisture levels below 15 percent has a longer storage life, farmers who use this method to guarantee good keeping qualities will be penalized when the corn is delivered for sale.

In the case of discounts for high-moisture corn or soybeans, the reduced price is offset by the fact that the farmer is delivering additional water. In fact, many elevators subtract the weight of water from the scale weight to adjust the sale quantity to the weight it would have been had the grain been dried to the base moisture. In the case of grain that is below the base moisture, there is no compensating increase in value. Because price is seldom adjusted for grain below the base moisture, every 60 pounds of water removed from a load of soybeans means the seller will be paid for one less bushel. Water lost is worth its weight in grain up to the base moisture content. Every bushel of water removed from the grain represents a net loss to the seller equal to the price of corn, soybeans, or wheat. Farmers delivering grain above the base moisture receive less penalty than farmers delivering at lower moisture levels even though the drier grain will store longer, contains less mold and insect damage, and yield more final product per bushel.

Let's examine the principles of water loss in grain to better understand the concept of hidden discounts, the problems they create, and a solution to the problem.

Understanding Shrink

When grain contains excess moisture, buyers must subtract the excess weight of the water. They cannot afford to pay grain price for water. The weight adjustment for excess water is a fixed relationship that can be mathematically calculated independent of price or product. If 100 pounds of water is removed from a 500-bushel truckload of corn, the scale weight is 100 pounds less but the dry matter in the form of corn remains unchanged. The calculation can be easily demonstrated and the formula can be locked into a calculator. Conversion tables are also available.

Let's take an example of 100 pounds of corn at 25 percent moisture. This means there are 75 pounds of dry matter and 25 pounds of water in that 100 pounds of corn. Removing 1 pound of water leaves 75 pounds of dry matter and 24 pounds of water, but moisture content has not been lowered to 24 percent. The moisture content of the remaining 99 pounds of corn is now 24.2 percent (24 pounds of water divided by 99 pounds wet weight equals 24.2 percent). We would need to remove 1.32 pounds of water from this 100 pounds of corn in order to reduce it from 25 percent to 24 percent moisture content.

The formula for calculating any of the four variables involved in changes in weight associated with changes in moisture is:

$$(\%\ DM_w) \times (Q_w) = (\%\ DM_b) \times (Q_b)$$

where: % DM = % dry matter = 100 – % moisture content,
Q = quantity of grain in pounds, tons, or bushels, and the subscripts w and b identify wet-moisture and base-moisture grain, respectively.

The formula for calculating remaining bushels is derived from this general formula. When drying 1,000 bushels of 25 percent moisture corn to 15 percent moisture, the remaining bushels are:

$$Q_b = \frac{\%DM_w}{\%DM_b} \times Q_w$$

$$Q_b = \frac{75}{85} \times 1{,}000 = 882.3$$

Shrink is calculated by subtracting the remaining bushels of base moisture (Q_b) from original wet bushels (Q_w) and dividing by original bushels.

> (1,000 - 882.3) ÷ 1,000 = 0.1176 = 11.76% for a reduction of 10 points, or 1.176 percent per point of moisture removed

The 1.176 percent is called the shrink factor and gives. This is the actual shrinkage in percent loss for each percentage point reduction. The shrink factor varies depending on ending moisture, but it can always be determined very simply by dividing the percent dry matter at base moisture ($\%DM_b = 100 - \%M_b$) into 100. In the example above, the shrink factor is

$$\frac{100}{85} = 1.176\%$$

"Pencil shrink" is the term used when the loss of weight due to the reduction in moisture content is calculated rather than measured by actually weighing the grain before and after drying. Most elevators use a shrink factor that is multiplied by the percentage points of moisture removed times the number of bushels of grain. The 1.176 percent in the previous example is usually rounded to 1.2 percent. This shrink factor approximates the actual weight loss for each percentage point of moisture reduction from any beginning moisture to a base moisture of 15.0 percent. The factor will vary slightly with the ending moisture. The shrink factor for 13 percent ending moisture is 1.49 percent. Many elevator managers use larger shrink factors as a way to cover losses incurred in handling and drying. In a recent survey, 7 percent of the respondents used a factor of 1.2 percent, 21 percent used a factor of 1.3 percent, and 71 percent used a factor of 1.4 percent or above. For a gross weight of 1,000 bushels of 18 percent moisture corn dried to 15 percent moisture, the difference between using the 1.4 percent shrink factor and the actual weight loss is equal to 6.7 bushels. The elevator has received 6.7 bushels more corn than was purchased from the farmer. While the elevator manager is entitled to this extra income in order to cover his operating costs, it would be helpful if costs were clearly differentiated from actual weight reduction. Different elevators using different shrink factors confuse producers who interpret the shrink factor as an actual weight loss that is unavoidable whether the corn is dried on the farm or at the elevator.

Calculating Losses from the Hidden Discounts

The use of shrink factors for adjusting the weight of high-moisture grain to a base moisture are well recognized in the grain trade. However, the reverse adjustment for grain at moisture levels below the base is seldom used. If grain is dried below the base moisture, every bushel or ton contains more dry matter than the same weight of grain at the base moisture. For example, 100 bushels of soybeans at 10 percent moisture content is equivalent to 103 bushels at 13 percent base moisture. Farmers delivering corn, wheat, or soybeans below the base moisture are penalized by current pricing practices because they are paid for less grain than they actually deliver. If soybeans are priced at $6.50 per bushel, the farmer in this example will receive a penalty of $19.50, 19.5 cents per bushel. If using pencil shrink is justified on the grounds that elevators cannot afford to buy water at grain prices, then the reverse should also hold true. Farmers cannot afford to give away the extra three bushels of soybeans in the preceding example.

The losses that farmers incur by delivering grain below the base moisture are shown in Table 1. Corn is often dried to 14 percent to ensure that it will not be damaged by mold and insects during storage. Soybeans and wheat may dry to 9 or 10 percent moisture content in the field before the farmer can complete harvest. The table shows the equivalent bushels at the different moisture contents. Subtract 1,000 from each number and you can see the quantity that farmers give away at various moisture levels. Multiply the number by the price of grain and the economic penalty—the hidden discount—can be seen.

Economic Incentives for Uneconomic Practices

The hidden discounts for grain dried below base moisture create economic incentives for implementing at least two management strategies that do not make sense from an economic standpoint.

1. Farmers and country elevators have an incentive to harvest, store, and sell grain (especially corn) at moisture levels above those recommended for safe storage and transport. The penalty for too much moisture is less than the penalty for too little.
2. Every seller who has grain below base moisture has an incentive to add water through spray misting, by aerating with humid air, or by blending with wet corn to increase the moisture content of the dry grain to base moisture.

None of these practices improve the quality or *intrinsic value* of the grain, but they do increase *market value* of the grain because the price per bushel is the same for 13 percent moisture corn as for 15 percent. In fact, adding moisture in these ways can create serious losses in storage and problems in quality control. They can also lead to potential abuses and illegal actions.

The Federal Grain Inspection Service (FGIS) of USDA, the Food and Drug Administration (FDA), and the U.S. Congress have all initiated actions to prohibit the addition of water to grain. Although FGIS's recent proposal to prohibit adding moisture was directed primarily at using moisture for dust control, the regulation is applicable throughout the market channel and includes farmers. The prohibition on adding water at port elevators will be relatively easy to enforce; enforcement throughout the market will be extremely difficult. Differentiating between grain that is naturally moist and grain moistened by deliberate actions is impossible. Moisture meters employed in grain transactions cannot differentiate between corn that has been dried from 17 percent down to 15 percent and corn that has been rewetted from 14 percent up to 15 percent.

Furthermore, there are many ways to increase the moisture content of grain. The direct application of water by mechanical means is a controversial method that has been illegal for many years under the Food, Drug and Cosmetic Act. However, aeration during periods

Table 1. Equivalent Bushels in 1,000 Bushels of Grain at Various Moisture Contents

Grain moisture, percent	Corn, 15.0% base	Soybeans, 13.0% base	Wheat, 13.5% base
8	1,082	1,057	1,064
9	1,071	1,046	1,052
10	1,059	1,034	1,040
11	1,047	1,023	1,029
12	1,035	1,011	1,017
13	1,024	1,000	1,006
14	1,012	989	994
15	1,000	977	983
16	988	966	971
17	976	954	960
18	965	943	948
19	953	931	936
20	941	920	925

when the humidity of the air is high can also add water to the grain. Blending grain of diverse moisture contents, even with only one or two percentage points difference, results in moisture moving from wet kernels to dry kernels. In this case, water *is* being added to the dry grain, although it can be attributed to a biological rather than a mechanical process. Farmers also recognize that the moisture content of corn, wheat, and soybeans can change in the field prior to harvest. The moisture content of soybeans may increase two or three percentage points between late afternoon and the following morning if there is a heavy dew. The kernel of corn or soybeans is indifferent to the source of moisture, whether it is from an adjacent kernel, from exposure to humid air, or from absorption during misting. The end results are the same.

The complexity of enforcing a prohibition on adding water to grain has plagued government agencies since French merchants were accused of wetting wheat to "freshen" and "swell its volume" in the early 1700s. In 1919, the secretary of agriculture expressly forbade the addition of water to oats following a national scandal in 1915 when elevator managers were found to be adding water prior to shipment. U.S. government agencies have recognized the difficulty of identifying grain that has been rewetted and have focused instead on trying to police the practice and technology of rewetting. FGIS has ruled that grain will be considered adulterated only if the moisture is added by mechanical means (that is, water or mist is sprayed directly on the grain). Other techniques for adding water to dry kernels will not be prohibited. Yet the other alternatives have the same end result. FDA regulations cover any method of increasing moisture content, but they rely on the farmer's motives to differentiate between adulteration and aeration, an even more difficult distinction to enforce. The FDA has ruled that aeration during high humidity is not illegal if the purpose of the aeration is to cool the grain. The addition of water to grain cannot be detected after the fact, and enforcement must rely upon inspectors actually observing the process or identifying the equipment installed for use in adding water.

A Solution to the Rewetting Problem

There *is* a simple alternative to the complex prohibitions that are now being considered. The alternative has been proposed repeatedly since the early 1920s. A simple change in marketing practices to base price on the equivalent bushels would remove incentives for adding water to grain. If the economic incentives were removed, no water would be added unless it was needed for processing or quality control. Purchasing grain on the basis of the dry matter that it contains eliminates any economic advantage from adding water to dry grain. If a farmer has a load of 10 percent moisture soybeans that weighs 60,000 pounds on the elevator scales, the elevator manager can easily calculate that the 60,000 pounds is equivalent to 1,034 bushels at 13 percent moisture. The farmer's total payment should be the same whether he delivers the dry beans with a pencil adjustment or whether he takes the beans back home and runs them through a mist to bring the moisture content back to 13 percent. Buying on the basis of the dry matter in the soybeans (or any other grain) leaves the farmer equally well off if he delivers dry grain (which the market prefers) or if he adds water to increase the moisture content to the base level, increasing the weight across the scales but jeopardizing storability.

The proposal does not require major changes in pricing practices. Grains would be priced on the basis of current base moistures—15 percent for corn, 13 percent for soybeans, and 13 or 13.5 percent for wheat. The weight of all grain at any moisture content would be adjusted to the equivalent weight at the base moisture. The equivalent bushels can be calculated by formula or by using tables whether moisture content is above or below the base moisture. The same shrink factor that elevators use to adjust the weight of 18 percent moisture corn to the equivalent weight at 15 percent moisture can be used to adjust 10 percent soybeans to the equivalent weight at 13 percent moisture. If elevators were required to use the same formula for adjusting dry grain as they use for wet grain, shrink factors greater than actual water loss would quickly be reduced to the true mathematical value. A standard is required to establish the amount of dry matter in an equivalent bushel of each grain. Table 2 shows the required weight using a suggested base moisture. Using the base moisture accepted for current market transactions eliminates the need to change quoted prices.

Overdrying of grain, primarily corn, lowers the quality of the grain because it becomes more susceptible to breakage during handling. Some people have argued that dry-matter pricing would encourage overdrying. This argument does not make sense. Why would producers deliberately incur the high costs of drying for no increase in price or value? Breakage susceptibility and broken corn are important quality characteristics, but elevator managers may discount on these factors if they want to further discourage farmers from drying below the optimum moisture content. Quality discounts should not be confused with adjustments in quantity for different moisture contents. Corn dried below safe moisture levels for safe storage is surely an accident or poor management on the part of the producer, not an intentional decision to overdry. Given the cost of drying and the potential for discounting brittle corn, the logical response of farmers to the equivalent bushel concept would be the delivery of all grain at the moisture content dictated by environment, storage, or handling methods.

The use of the equivalent bushel concept has the additional advantage of equity among producers—who should be paid according to grain value. Under the current pricing and discounting methods, elevators are earning a competitive return on their investment. Those returns are generated by charges for services, merchandising margins, and income derived from blending diverse moistures and qualities. However, the farmer selling dry grain contributes the most to the elevator's blending income. Farmers selling grain at moisture levels below the base are paid less than the true value of their grain; farmers with wet grain are paid more than the true value. The current system is inequitable because the farmer doing the best job of quality control is subsidizing the farmer doing a poor job of managing moisture content. For example, a producer who has stored his grain at 16 percent moisture and delivers it to the elevator just as the first blue-eye mold begins to show will receive more total returns per thousand bushels than a farmer who has stored his corn at 14 percent moisture and delivers it in perfect condition with full storage life remaining.

The advantages of using the equivalent bushel concept are summarized below.

1. It removes the incentive for adding water to grain to increase its weight.
2. It separates the determination of quantity from the determination of quality.
3. It allows producers and marketing firms to select the optimum moisture content for managing storage, handling, and quality without being penalized on quantity.
4. It eliminates the inequity among sellers, requiring payment according to value.
5. It provides a more uniform basis for the export trade. Foreign buyers receiving 14 percent moisture corn on a 15 percent moisture contract will be required to pay for the extra dry matter.

The industry has the opportunity to take the initiative and adopt a strategy of pricing on the basis of equivalent bushels at base moisture.

Table 2. Amount of Dry Matter Required for an Equivalent Bushel of Corn, Soybeans, and Wheat

Grain	Base moisture, percent	Weight per bushel, pounds	Dry matter/bushel, pounds
Corn	15.0	56	47.6
Soybeans	13.0	60	52.2
Wheat	13.5	60	51.9

This would eliminate the need for legislation. The use of regulations is not a desirable alternative because it will be expensive and difficult to enforce, it will increase costs in the marketing channel, and it will not correct current inequities among sellers with grain above and below base moisture contents. The equivalent bushel (or ton) system eliminates the need for more government regulation.

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The Farmer's Stake in the Grain Grades

This past year, farmers have seen a lot of publicity about proposed changes in grain grades. These changes will directly affect farm prices because discounts at the elevator are tied to USDA grades. But conflicting information and advice have left farmers uncertain about supporting or opposing these proposals for change.

Farmers welcomed the original Grain Standards Act of 1916 because it assured them that grades would be objectively and uniformly applied to all buyers and sellers. However, after 75 years of application of these grades, farmers believe that they have little influence on the grades and discounts. According to a survey of Illinois farmers, only 7 percent thought farmers had an influence on current grain grades. However, 45 percent of those farmers believed that they should have a major voice in any future changes in grades and standards.

If farmers are to have a more active role in setting grades (either directly or through producer organizations), they need to understand the purposes of grades and how grades and discounts influence farm income, market shares, and marketing efficiency.

Farmers and farm organizations hold different and often opposing views about changing grades for corn and soybeans. Some have supported proposals for change while others have strongly opposed them. The confusion among farmers is due in part to conflicting information circulated by grain handlers, politicians, foreign buyers, and trade organizations, all trying to persuade farmers to support their particular position. With the confusing and conflicting messages farmers have received, many have decided to stay with the status quo. For example, in a survey of Illinois farmers, fewer than 10 percent of the respondents wanted any changes in the corn grades, and 91 percent of the respondents wanted the test-weight grade factor for corn left as it is. A similar pattern emerged for soybeans with the exception of splits where 56 percent of the Illinois respondents thought that factor should be changed or removed.

The confusion and reservations about supporting change may be partly the result of different interpretations given to a few basic facts. An objective review of these facts can help farmers determine for themselves whether they should oppose the grade changes currently being proposed.

The important issues revolve around these important questions. Will changes in grades and standards change U.S. market shares? Will changes increase farm prices? Will they increase the number of discounts? And, finally, will changes increase or decrease marketing costs and efficiency?

Market Shares

International market shares of corn and soybeans are determined primarily by the volume of corn and soybeans available for export in each country. The U.S. market share for corn has diminished from its high point in the 1970s. This change has been primarily the result of increased production in France, China, and Argentina. Increased production in France has changed Western Europe from a net importer to a net exporter. Increased production in Argentina has been a response to increased

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profitability of corn relative to other crops. Corn exports from China have increased primarily as a result of changes in their policies.

The United States has also lost market share in the international soybean market with Brazil, Argentina, Paraguay, and Bolivia increasing their production and exports. Production in all these countries but Argentina has come from expanded acreage on newly cleared land. Argentine expansion has been the result of double-cropping with wheat, increased fertilizer use, and substitution for less profitable crops.

Domestic demand and storage space for corn and soybeans are limited in all of these countries, so any increase in production will be moved into the export market at some price. The only way to increase the U.S. market share is to reduce production in competing countries. The limited response of South American producers to lower world prices strongly suggests that a small increase in the quality and value of U.S. corn and soybeans will not be enough to make our competitors leave their newly cleared land idle.

Improved quality may give the United States some additional competitive advantage; buyers base their purchasing decisions on price relative to value. Improved quality becomes one more tool when trying to compete in sophisticated markets where price and quality are closely linked. But an increase in the value of the U.S. crop would likely be met by a reduction in price by our competitors. Improving quality of corn and soybeans through changing grades will, therefore, have little effect on U.S. market shares.

Income Effects

Changes in quality may affect farm income through two different variables. Higher quality may increase producers' prices, either as a premium for selected characteristics or by raising the overall average. However, increasing the number of factors in the grades may increase the frequency and severity of discounts. Changes in grades could increase prices, or they could increase discounts. It is important to examine each of these possibilities.

Relationship Between Prices and Quality

Processors will pay no more for corn and soybeans than the value of the products that they can derive from the raw grains. They will pay as little as competition will allow. Competition sets the minimum price in the market. Each firm checks for the best selling price and then adjusts profit margin to set a bid price to farmers that is just high enough to acquire the needed supply. The price to farmers cannot be higher than the value of the products obtained by processing, minus competitive margins. Profit margins are set by competition and are not affected by the quality or value of the raw product. This principle says that price and value must be related. When value is increased through higher prices for processed products such as oil and meal, competitive forces will raise farm prices. Changes in quality that result in a higher yield of starch in the corn wet-milling industry or more oil or higher protein in the soybean processing industry will also be reflected in higher prices for the raw products as each firm competes to gain additional supplies. Lower value will be followed by lower prices to producers as the industry adjusts to maintain competitive margins. Following the same logic, changes in quality that result in greater intrinsic value in the grain will be accompanied by higher farm prices. The important principle for use in predicting the effect of quality changes is that changes in the value of the crop will be accompanied by changes in the base price in such a way that average price and average value will move together.

Frequency of Quality Discounts

Farmers often resist proposed changes in grades with the argument that any new grade factor will mean additional discounts and lower total income. This argument fails to explain why respondents to the farm survey objected to removing test weight as a grade factor because its removal should eliminate one of the factors on which farmers are often discounted. If adding grade factors decreases farm income, it would seem that removing grade factors would increase farm income. However, the farmers who opposed adding new factors were often the same farmers who opposed eliminating any of the current factors.

The best way to reduce discounts to farmers is to eliminate all grades. Elimination of all grades would mean that all producers would receive the same average price with no discounts for quality. Most farmers in the survey opposed this alternative. In addition to removing all incentives to produce high-quality grain, proposals for eliminating all grades and discounts have another serious flaw. Because the value of a crop is based on the value of the products that can be produced from it, changing grade factors or limits does not change the value of the products that can be produced from the crop; it only changes the relative price paid for one load compared to another. Average price regardless of quality penalizes good quality and rewards poor quality. As average quality declines, processors will reduce average prices, lowering income to all farmers. Average quality pricing violates two important principles: (1) each farmer should be paid according to the value of the grain that is delivered; and (2) price differentials should generate the incentives for producing those qualities of grain with the greatest value to processors.

Changes in discounts and the number of factors to be discounted will be accompanied by a change in the base price so that the total value of the crop will be unchanged. However, the distribution of that value among farmers delivering different qualities of grain will be changed. Removing test weight as a grade factor will eliminate all discounts on test weight, but it will not transfer profits from the grain industry to producers. For the same reasons, lowering the limit on foreign material for No. 1 soybeans will increase the number of farmers that will receive discounts, but it does not lower the value of the total crop that has been produced. The base price on average must reflect the true value of the crop on average, and changing terminology or grade descriptive factors does not alter the value of the crop.

Grades Do Not Determine Quality

The purpose of grades and standards is to describe the quality that exists in the market channel so that buyers and sellers may determine value and may negotiate price without testing or examining each individual lot. Changes in grades or factor limits do not automatically alter the quality of the crop that has been produced. Quality can be changed only by changes in the actions of these people: producers, marketing firms, and processors. Grades and standards, when accompanied by market prices and price differentials, provide the incentives that encourage producers or marketing firms to change their practices.

Benefits from Changing Grades

The previous statements and paragraphs provide little basis and little encouragement for farmers to support changes in grades and standards. The justifications for change must come from a different set of facts. The benefits to be derived from changing grain grades revolve around three issues: increased efficiency, increased equity, and incentives for increased value.

Increased Efficiency

The primary purpose of grades and standards is to allow buyers and sellers to establish value and price through description. The characteristics described by grades must be those that are economically important to corn and soybean processors. The concept of "end-use value" was introduced into the 1986 Grain Quality Improvement Act and requires that grades and standards be changed to better reflect end-use value. This means that the factors included in soybean grades should reflect the quantity and quality of the oil and protein that can be extracted. Quality factors in the corn grades should be associated with feeding value, starch yield, or yield of dry milling products. The more accurately the buyer and seller can determine true value and price, the less costly the marketing transactions will be. If the buyer cannot accurately determine the value of the shipment, he will increase marketing margins and lower his offering price to cover the risks of errors in estimating value.

Current grades for corn and soybeans provide very little information about the value of that shipment in its intended use. No. 3 corn may have higher protein and starch or lower breakage susceptibility than No. 2 corn. No. 1 soybeans may produce less oil and meal than No. 2 or even No. 3 soybeans. Recent proposals for changes in grades have tried to add characteristics that are more closely associated with end-use value. For example, the Federal Grain Inspection Service (FGIS) of the USDA now provides information about oil and protein contents of soybeans at export points when requested. The same information is not available to farmers. It has been proposed that this information be extended back through the market channel. In the case of corn, separation of the factor "broken corn and foreign material" (BCFM) into "inert materials" and "broken kernels" (two factors instead of one) has been proposed. It has also been suggested that corn grades should contain information about starch content and breakage susceptibility. These types of changes will provide buyers with better information on which to base their estimates of true value of the shipment that they are receiving. More detailed and accurate information reduces the cost of marketing.

Lower limits on grade factors also increase the amount of information conveyed by grades. For example, under the current grades, No. 3 corn could contain 5.1 percent or 7.0 percent BCFM. No. 1 soybeans containing 1.1 percent foreign material (FM) are given the same grade as soybeans containing 2.0 percent FM. If the allowable spread between grades were reduced, numerical grades would convey more detailed information. Several changes in grades and standards that would increase the amount of information, increasing marketing efficiency and reducing marketing costs, have been proposed. Part of the reduced costs would be passed back to producers.

Equity

One of the reasons for having grades and standards is to pay each producer according to the value of the crop that is delivered. Farmers who use low-temperature drying, store their corn at safe moisture contents, and minimize physical damage during combining should be rewarded for the extra costs, effort, and for their management skills. Yet, under the current system of grades, those characteristics are not included in price differentials paid to farmers. Farmers delivering corn at moisture levels below 15 percent are paid less per pound of dry matter and receive lower returns per acre than farmers delivering corn at 15 percent moisture or above. Farmers delivering clean corn or soybeans sell fewer bushels at the same price than farmers delivering corn with 3 percent BCFM or soybeans with 1 percent FM. Pricing strategies and factor limits that fail to reward better quality with a higher price create negative incentives for improving quality and result in inequitable treatment among farmers and regions. Because 67 percent of Illinois farmers delivered soybeans with less than 1 percent FM in 1991, exporters loading 2 percent FM rely on buying clean beans at a bargain price from Illinois farmers in order to blend them with high-FM soybeans from other states. The average price to farmers in all the soybean-producing areas may be equal to average value, but if the "average price equals average value" principle holds, farmers delivering soybeans with less than 1 percent FM are subsidizing farmers delivering soybeans with higher FM levels.

Incentives for Improved Quality

A third reason for grades is to allow the market to place price differentials on differential quality, creating an incentive for producers to change practices. The oil and protein content of soybeans can be increased through genetic selection. However, the market does not pay on the basis of oil and protein content, and there is no incentive for farmers or plant breeders to select varieties that will yield higher oil and protein. Factor limits that do not differentiate between 0 and 3 percent BCFM in corn provide an incentive for producers to set their combines so that they can deliver 3 percent BCFM. Weed seeds have the same value as corn up to the 3 percent limit. Grades could be changed to encourage the market to reward above-average quality and penalize below-average quality.

Summary

In summary, changes are needed in corn and soybean grades to increase their ability to describe quality and value. The justification and motivation for change cannot be based on expectations of: (1) increasing market share, (2) strengthening our competitive position in world trade, (3) increasing the price for current crops, or (4) avoiding discounts to farmers.

The justifications for changing grades and standards are: (1) to increase the efficiency of marketing, thereby increasing the farmer's share of the final price; (2) to increase equity so that each farmer is paid according to the value of the product he delivers; (3) to generate incentives for change, thus improving the quality and value of U.S. grains as managers change practices and varieties; and (4) to better serve the needs of overseas customers by providing them with more detailed information about quality differences and a wider range of price-quality relationships at competitive prices.

The farmer has a stake in changing the grades. He can benefit directly from more equitable pricing and indirectly from increased marketing efficiency and expanded demand. Quality incentives benefit those farmers producing crops of above-average quality, and they may benefit all farmers by expanding markets for the higher quality products. However, payment according to value is workable only if value is accurately and uniformly described by grades and quality factors. Market prices and price differentials are efficient tools for indicating the kinds and qualities of grain that have the greatest value. Market prices are also efficient in directing different qualities of corn and soybeans to the appropriate user able to pay the highest price.

It is important for farmers to identify those changes in grades that will increase information and then to encourage their adoption. While the present system for measuring quality has performed well for many years, there are opportunities for additional improvements and farmers' voices should be heard in the current debate.

If you want to express your opinion on any of the proposed grade changes, write to: John Giler, Federal Grain Inspection Service, USDA, Room 1666-S, P.O. Box 96454, Washington, DC 20090-6454.

If you need more information on proposed changes in corn and soybean grades, contact Lowell Hill, Department of Agricultural Economics, 306 Mumford Hall, University of Illinois, 1301 W. Gregory Drive, Urbana, IL 61801.

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Returns on Assets and Returns on Equity on Illinois Farms

The financial performance of a business can be measured in many ways, including net income, growth in net worth, returns on assets (ROA), and returns on equity (ROE). Measures such as net income or growth in net worth are absolute dollar amounts that tend to vary by size of operation. In contrast, ROA and ROE are ratios that allow for more valid comparisons across different sizes and types of farms as well as comparisons to nonfarm measures of financial performance. The Farm Financial Standards Task Force (FFSTF), an industrywide group devoted to improvement in financial reporting for agricultural producers, has recommended the use of both ROA and ROE as measures of financial performance.

Issues in Measuring ROA and ROE

The FFSTF defines ROA in the following manner:

  net farm income from operations
+ farm interest expense
− value of operator and unpaid family labor and management

÷ average total farm assets

Several words of caution and explanation are important in understanding this ratio. Net farm income *from operations* is used rather than "net farm income." The difference is that net farm income from operations excludes capital gains or losses that may distort the results in any one year. Also note that the ratio is calculated on a before-tax basis.

Interest expenses, measured on an accrual basis, are included because the ratio is intended to measure a return to all assets used in the operation, whether provided by the farmer or the lender. Interest expense is subtracted to arrive at net income from operations, so it is necessary to add back interest expenses to get the proper return to all assets.

Because the objective of ROA is to measure a return to assets, it is necessary to subtract a charge for any unpaid labor provided by the operator or the operator's family. Two approaches can be used to estimate this number. The first is to use the actual amount of family living withdrawals. While this approach is recommended by the FFSTF, it can be quite misleading if family living withdrawals are unusually high due to medical expenses, college education expenses, or lavish spending habits. An alternative approach is to impute a charge for each hour of unpaid labor provided by the operator and the operator's family. That approach tends to provide greater consistency when comparing ROA across a group of producers.

Because the returns measured are only for the farming operation, it is important that only farm assets be used in the denominator of the equation. Classification of some assets into farm versus nonfarm categories can be problematic. There is also some question of how to "average" assets. The most common procedure is to take amounts from the beginning and end of the year and divide by two. For operations that track assets on a monthly basis, a more refined procedure can be used. Despite all of the problems and issues, ROA is still a very valid and useful measure of the financial performance of farm firms.

The FFSTF suggests that returns on equity (ROE) be measured as follows:

net farm income from operations
− value of operator and unpaid family labor and management

÷ average total farm equity

All of the issues identified above for measuring ROA also apply to measuring ROE. In addition, the inclusion or exclusion of deferred taxes on the balance sheet can affect the validity of the ROE measure. Most farm operators report income on a cash basis. Consequently, increases in crop and livestock inventories and capital assets (primarily land and machinery) with a market value in excess of book value all create deferred taxes. If these deferred taxes are excluded from the balance sheet, owner equity is overstated and, as a consequence, ROE is understated. This issue is particularly relevant when comparing ROE among different farms and especially when comparing ROE on farm and nonfarm investments. It is also important to remember that ROA and ROE measures do not include unrealized capital gains or losses.

Both ROA and ROE can be measured either at cost or market value. Cost-based measures may be particularly useful when comparing returns among farm and nonfarm firms. Most nonfarm firms report their balance sheets on a cost basis. However, most farm firms have very limited information on a cost basis, so most of the balance sheets reported by farm firms are on a market value basis. Consequently, most ROA and ROE measures for farm firms are reported on a market value basis.

ROA Versus ROE

Valuable information can be obtained by comparing ROA and ROE for a given operation. Three possible relationships exist:

1. ROA = ROE
2. ROA > ROE
3. ROA < ROE

ROA is equal to ROE in situations when the operation uses no borrowed funds. If debt capital is used, it is quite unlikely that ROA will exactly equal ROE. When borrowed capital is used, is it more desirable to have ROA exceed ROE or vice versa?

To answer this question, remember that ROA is a return to both the lender (in the form of interest payments) and the farmer. ROE, in contrast, is a return only to the capital invested by the owner. Therefore, from the farmer's perspective, it is much better that ROA is less than ROE. If this is not the case, borrowed funds being used by the operator are, on average, costing more than the assets acquired with these funds are generating in returns. The key phrase here is "on average." For many farming operations, ROA is greater than ROE. Yet, at the margin, it might be useful to employ borrowed funds to acquire more assets if good investment opportunities exist.

ROA and ROE Comparisons for Illinois Farms

Data for the period 1987 through 1992 obtained from the Farm Business Farm Management (FBFM) record-keeping program are used in the analysis that follows. In general, the data reported for ROA and ROE are measured in a manner consistent with FFSTF recommendations. The only exception is that the value of operator and unpaid family labor and management is an imputed value rather than the actual amount of family living withdrawals. However, this procedure does create consistency across farms in the amount charged for unpaid labor.

Tables 1 and 2 show ROA and ROE for grain farms classified by size of farm. For each category, the quartile break is provided. For example, in 1987 for farms in the less than 300-acre size, the upper quartile break for ROA is 5.1 percent. That means that 25 percent of the farms in this size category had an ROA of 5.1 percent or higher. The median is 2.1 percent, meaning that 50 percent of the operators in this category had an ROA of 2.1 percent or higher and 50 percent had an ROA of less than 2.1 percent. The lower quartile break shows that 25 percent of the operators in this size category had a ROA of under −1.1 percent. All subsequent tables can be interpreted in the same manner.

A comparison of Tables 1 and 2 reveals that both ROA and ROE tend to increase as the size of farm increases. The smaller farms tend to be owner-operated units with relatively small amounts of debt. The larger units tend to have more debt and lease more land. Consequently, ROA and ROE measures tend to differ more for the large farms than for the small farms.

The figures in Table 2 marked with an asterisk represent those size categories in which ROE

Table 1. Rate of Return on Farm Assets for Illinois Grain Farms by Tillable Acres

	Tillable Acres				
Quartile	0 to 300	301 to 600	601 to 900	901 to 1,200	>1,200
			------- percent-------		
1987					
Upper	5.1	8.9	12.6	13.5	13.3
Median	2.1	5.7	8.4	9.7	10.5
Lower	-1.1	2.7	5.6	6.6	8.4
1988					
Upper	2.5	5.1	7.1	7.7	8.9
Median	0.9	1.9	3.8	3.8	5.5
Lower	-1.2	-0.9	0.7	1.1	2.5
1989					
Upper	6.3	11.0	14.3	14.7	15.4
Median	3.2	6.6	9.8	10.3	10.5
Lower	1.1	4.0	6.4	6.3	7.4
1990					
Upper	5.6	9.5	13.0	14.0	13.7
Median	2.0	6.0	8.8	9.8	9.3
Lower	0.6	3.4	5.8	6.5	5.6
1991					
Upper	0.5	5.7	7.3	9.2	9.6
Median	-0.8	2.4	3.8	5.3	5.4
Lower	-3.5	-1.7	0.1	1.2	1.0
1992					
Upper	3.2	10.1	14.8	15.1	17.5
Median	1.7	6.6	9.4	10.8	12.7
Lower	-0.8	3.5	6.0	7.4	8.4

exceeds ROA. A review of the table shows that ROE seldom exceeds ROA on small farms, suggesting that these farms are on average not using borrowed funds in an effective manner. In contrast, the largest farms in the highest quartile consistently generate an ROE that exceeds ROA. The results clearly indicated that the larger farms tend to generate better financial performance.

Tables 3 and 4 identify ROA and ROE by tenure, defined here as the ratio of the value of land owned to the value of land operated. A review of the tables clearly indicates that farms that rent most of the land they operate tend to have higher returns. These farms also tend to be the larger farms, so in part these tables reflect the same type of information contained in Tables 1 and 2.

As shown in Table 4, on farms where over 50 percent of the land operated is owned land, ROE seldom exceeds ROA. In contrast, on farms that are primarily operated with rented land, ROE often exceeds ROA, especially for upper quartile farms.

The superior performance of primarily tenant-operated farms has important implications for farmers contemplating expansion through the purchase of land. Such expansion may lower returns on equity capital, especially if borrowed funds are used to finance the purchase. However, the ownership of land could reduce the risk of not having property to farm. Most farm leases are relatively short-term contracts, and new tenants or owners may result in the loss of rented property.

Table 2. Rate of Return on Equity Capital for Illinois Grain Farms by Tillable Acres

Quartile	Tillable Acres: 0 to 300	301 to 600	601 to 900	901 to 1,200	>1,200
			------- percent-------		
1989					
Upper	4.6	10.2*	16.2*	16.9*	20.4*
Median	0.7	5.0	9.3*	10.6*	12.9*
Lower	–4.1	1.5	4.0	5.7	7.5
1988					
Upper	1.8	3.3	6.7	9.1*	9.3*
Median	–1.6	–0.4	1.9	1.1	3.1
Lower	–3.7	–5.2	–4.9	–4.0	–3.3
1989					
Upper	5.8	12.6*	20.1*	22.4*	19.9*
Median	1.9	6.0	10.1*	10.7*	11.9*
Lower	–0.9	2.4	5.0	3.8	6.4
1990					
Upper	5.8*	10.6*	16.3*	20.0*	18.5*
Median	1.2	5.2	9.4*	9.7	9.7*
Lower	–2.2	1.6	4.3	5.5	3.7
1991					
Upper	0.0	4.9	6.9	8.6	11.1*
Median	–3.0	–0.3	1.5	1.6	4.1
Lower	–11.3	–6.8	–5.4	–5.0	–4.7
1992					
Upper	3.2	12.4*	19.5*	23.4*	26.6*
Median	0.6	6.2	10.3*	13.3*	16.0*
Lower	–3.4	1.7	4.7	7.1	8.6

* ROE > ROA.

In comparing the ROE of farms at different tenure levels, it is important to remember that capital gains or losses are not included in the calculation of ROE. A farm that is operated by the owner will generate capital gains or losses for that operator. In contrast, a tenant operator normally does not share in any capital gains or losses. Over the time period covered in this study (1987-1992), land values in Illinois have generally increased but these returns are not included in the comparisons shown in Tables 3 and 4.

Tables 5 and 6 identify ROA and ROE for different types of farms. As shown in these tables, ROA and ROE tend to move in the same general direction for all farm types. For example, all farm types showed much lower returns in 1988 than 1987, probably as a result of widespread drought. Likewise, returns in 1991 were much lower on all types of farms than in either 1990 or 1992.

If you compare financial performance across types of farms, it appears that no one type of farm has dominated others in terms of returns on assets or returns on equity. These results are interesting because they suggest that there has not been substantial economic pressure in recent years to force farmers to consider major changes in enterprise (for example, moving out of dairy into beef cattle or vice versa).

Summary

The financial performance of a business can be measured in many ways, including measures of return on assets (ROA) and returns on equity (ROE). Data from the Illinois Farm Business

Table 3. Rate of Return on Farm Assets by the Ratio of Value of Land Owned to Value of Land Operated

	Percent				
Quartile	0 to 10	11 to 25	26 to 50	51 to 75	>75
1987					
Upper	14.8	10.8	8.7	7.7	6.9
Median	9.2	7.7	5.9	5.7	5.2
Lower	4.8	5.0	3.9	2.5	1.2
1988					
Upper	7.3	6.7	5.4	5.6	6.7
Median	3.0	2.9	2.7	3.1	2.3
Lower	-1.3	-0.2	0.5	0.8	0.0
1989					
Upper	17.5	11.9	9.8	7.0	6.0
Median	11.7	8.4	6.6	4.8	3.6
Lower	6.6	5.5	3.9	2.6	1.9
1990					
Upper	16.7	12.0	9.3	8.4	6.7
Median	10.6	8.8	6.2	5.6	4.0
Lower	5.9	5.7	4.0	3.1	2.1
1991					
Upper	9.0	7.1	5.5	4.3	5.4
Median	3.7	3.7	2.8	1.9	2.1
Lower	-2.1	0.1	-0.3	0.4	0.1
1992					
Upper	17.5	12.2	8.9	8.1	6.8
Median	11.8	9.1	6.7	5.6	4.2
Lower	6.0	5.8	4.1	2.5	1.7

Farm Management record-keeping program for the period 1987 through 1992 were used in this report. Results indicate that large farms generally outperform small farms, while farms that have a high proportion of rented land tend to outperform farms where most of the land operated is also owned. However, little differences in ROA and ROE were found for different types of farms.

A comparison of ROA and ROE can be used to determine if borrowed funds are, on average, generating returns higher than the cost of borrowing. The top quartile farms often generate an ROE that exceeds ROA, suggesting a favorable return from borrowed funds. However, many farms do operate with ROA in excess of ROE. Also, many farms exhibit an ROE that is well below what could be achieved in safe nonfarm investments like money market accounts or certificates of deposit. However, caution must be taken in comparing returns across industries because the manner in which balance sheets are constructed can influence the calculated measures of ROA and ROE.

Table 4. Rate of Return on Equity Capital by the Ratio of Land Owned to Land Operated

	Percent				
Quartile	0 to 10	11 to 25	26 to 50	51 to 75	>75
1987					
Upper	19.8*	13.6*	9.2*	7.4	6.6
Median	10.5*	8.0*	5.4	4.9	4.0
Lower	2.9	3.6	2.3	0.5	–0.1
1988					
Upper	7.1	6.0	4.0	4.1	5.1
Median	–0.2	–0.4	0.4	1.8	1.4
Lower	–9.6	–5.9	–2.7	–1.8	–2.0
1989					
Upper	24.8*	14.4*	10.1*	6.9	5.4
Median	12.7*	8.1	5.2	3.8	3.1
Lower	4.5	4.0	1.5	0.9	0.4
1990					
Upper	23.0*	14.4	9.6*	8.0	6.2
Median	12.3*	8.9*	5.0	4.6	3.3
Lower	4.3	4.4	1.6	1.3	1.0
1991					
Upper	9.6*	6.5	4.4	3.2	3.7
Median	–0.2	1.0	0.5	–0.3	0.7
Lower	–11.7	–5.2	–4.7	–4.4	–2.3
1992					
Upper	26.5*	16.4*	9.5*	8.2*	6.6
Median	14.3*	9.7*	6.0	4.5	2.9
Lower	4.4	4.6	2.6	0.4	0.0

* ROE > ROA.

Table 5. Rate of Return on Farm Assets for Illinois Farms by Type of Farm

	Type of farm			
Quartile	Hog	Grain	Dairy	Beef cattle
		-----*percent*-----		
1987				
Upper	13.3	11.1	12.5	13.1
Median	8.3	6.8	8.5	9.6
Lower	5.3	3.9	5.8	6.7
1988				
Upper	6.1	6.6	5.3	5.3
Median	1.9	3.0	2.7	3.3
Lower	–0.8	–0.1	0.3	-0.4
1989				
Upper	11.9	12.9	12.2	11.4
Median	6.4	8.3	8.5	9.4
Lower	2.6	4.9	3.8	0.4
1990				
Upper	17.9	12.0	10.8	14.7
Median	11.8	7.6	6.9	7.8
Lower	6.7	4.5	3.6	3.5
1991				
Upper	6.3	7.3	4.8	0.2
Median	2.1	3.4	2.1	–2.5
Lower	–1.5	–0.5	–1.5	–4.9
1992				
Upper	10.6	13.9	10.7	12.8
Median	6.8	8.6	5.1	8.6
Lower	2.4	5.1	1.2	2.1

Table 6. Rate of Return on Farm Equity for Illinois Farms by Type of Farm

Quartile	Type of farm			
	Hog	Grain	Dairy	Beef cattle
		-----*percent*-----		
1987				
Upper	17.7*	14.1*	15.5*	16.5*
Median	8.1	6.5	9.0*	10.8*
Lower	2.4	2.5	3.9	5.3
1988				
Upper	4.7	6.1	4.0	2.8
Median	−1.2	0.5	−0.4	−3.4
Lower	−8.7	−5.0	−3.8	−9.7
1989				
Upper	12.6*	16.0*	13.1*	11.2
Median	4.4	8.0	7.3	8.4
Lower	−1.1	3.1	2.1	−13.6
1990				
Upper	23.2*	14.4*	11.2*	21.6*
Median	13.7*	7.4	4.8	6.0
Lower	5.4	2.6	0.2	0.3
1991				
Upper	5.5	6.8	2.4	−2.5
Median	−1.5	0.9	−2.3	−10.7
Lower	−7.7	−6.0	−11.7	−19.7
1992				
Upper	13.0*	18.9*	10.1	20.3*
Median	6.0	9.1*	2.2	9.0*
Lower	−2.0	3.7	−2.9	0.4

*ROE > ROA.

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A Preliminary Assessment of the Economics of Variable Rate Technology for Applying Phosphorus and Potassium in Corn Production

Introduction

Variable rate technology (VRT) can combine advances in electronic global positioning systems (GPS) and geographical information systems (GIS) with computer-controlled applicators, enabling different rates of fertilizers and pesticides to be applied to specific areas of a field. As VRT becomes increasingly available and more affordable, it has the potential to increase the efficiency of these treatments by putting fertilizers or herbicides where they are most effective and reducing the total amounts applied. The analysis presented here is an attempt to examine the overall costs and capabilities of currently available technology for applying phosphorus (P) and potassium (K) fertilizers.

With VRT systems that are now available commercially, soil samples are generally collected every 2.5 to 3.3 acres on a regular grid pattern. GPS tracks the exact locations of these samples and provides a link so that applicators can accurately apply chemicals to meet site-specific needs. A dead reckoning approach using flags or other guides may also be used as a substitute for GPS. In addition, accurate position information enables future samples to be relocated precisely, which greatly improves the chances of observing changes from one sampling period to the next. As an example, Figure 1 shows the phosphorus and potassium test data from a 40-acre field sampled on a 2.5-acre grid.

49 316	34 /344	60 33[illegible]	88 35[illegible]
64 312	59 300	44 296	34 316
69 320	48/ 292	42 272	34 /284
53 332	53 232	35 /240	81 320

Figure 1. P/K soil-test levels collected on a 2.5-acre grid.

Soil sample locations and their laboratory analyses are entered into a GIS data base where they can be analyzed and mapped by computer. The pattern of soil fertility in the field is mapped using a mathematical process called kriging, which creates contour maps of fertility in either two or three dimensions. The kriging procedure estimates soil fertility levels for the entire field by interpolating between the levels measured at the actual points sampled. Figure 2 shows the contour map made by kriging the phosphorus data shown in Figure 1.

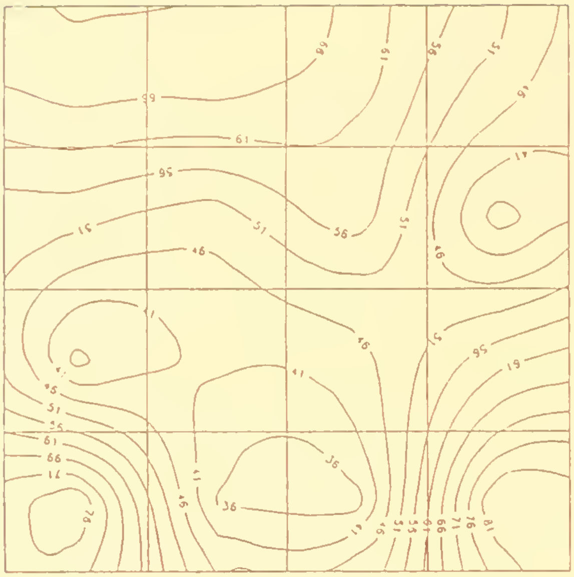

Figure 2. Phosphorus contours obtained by kriging.

The contour maps represent broad zones of fertility levels in the field. In turn, these zones are used to make fertilizer recommendations for the field. For example, high fertility zones receive lower (or zero) remedial fertilizer recommendations, and low fertility zones receive higher recommendations. These zone maps with their recommendations are transferred onto a computer chip to be used on board a special fertilizer-application vehicle. When linked to GPS, the on-board computer knows its location at all times and uses the digitized map to apply the appropriate fertilizer rate to each zone as it travels.

VRT has several other potential uses in addition to fertilizer applications, including variable planting rates and herbicide applications. With the advent of on-the-go yield monitoring, VRT can allow producers to map and correlate site-specific inputs and yields and link the information to other decision support systems through the use of GIS. This kind of locationally correlated information can help producers analyze the effects of their past decisions and help them project alternatives they wish to consider.

In deciding whether to adopt VRT for fertilizer application, both the costs and benefits of the technology should be considered. Costs include out-of-pocket expenses for collecting and analyzing soil samples and mapping the results, as well as the labor and equipment costs of applying the fertilizer at variable rates. Benefits include improving the efficiency of fertilizer use and reducing the environmental risk by avoiding the overuse or underuse of fertilizer.

Other reported efforts to assess the economics of VRT have been inconclusive. The results have been very sensitive to the assumptions brought to the study: "What yield-to-fertility relationships were used?" and "What were the initial fertility levels?" The studies have, for the most part, ignored implications of time and risk.

Of particular interest is a Missouri study (Buchholz, 1991) that used simulated site-specific responses of corn yield to P and K fertility to represent both variable-rate and uniform fertilizer prescriptions. According to that study, being able to apply fertilizer more precisely where it was needed did increase yields and gross returns, although the size of the increase varied with initial P and K fertility levels. The higher the beginning fertility, the smaller the gain. When the cost associated with increasing the precision of fertilizer application was considered, the results became inconclusive. In other words, whether or not VRT pays off depends on which aspects of soil fertility are being intensively managed, the cost of more intensive management, and the initial level of soil fertility (Buchholz, 1991).

In this newsletter, we will compare a uniform-rate P and K fertilizer application and differing levels of VRT precision (that is, different soil sampling intensities or grid size). A long-run net present value (NPV) analysis framework is used. The analysis is based on a central Illinois field and uses currently understood agronomic relationships and recommendations.

Data

We are using actual soil-test data from a 40-acre field northwest of Thomasboro, Illinois, in Champaign County, to simulate various fertility management scenarios, including VRT. The subject field was the site of a now-abandoned U.S. Air Force radar installation; it was not farmed with field crops from 1940 to 1982. Since 1982, this field has been in continuous corn. Based on the soils present, the field is assumed to have a target yield of 150 bushels per acre (*Soils of Illinois, 1984*) and to be in regions of the state that are low in phosphorus-supplying power and high in cation-exchange capacity (CEC) (*Illinois Agronomy Handbook, 1991-1992*).

In a 1993 agronomic study of soil sampling for variable rate fertilization, Franzen and Peck sampled this field using a 16 × 16 grid pattern.

This pattern yielded 253 samples, each representing 0.156 acre. Three other grid cells were occupied by building sites within the field. Composite soil samples were collected at each site and analyzed for soil pH, Bray P1, and available K. The 253 measurements of P and K represent the actual fertility levels found throughout the 40-acre field.

VRT costs more compared to uniform-rate fertilization because of the numbers and locational precision of soil samples, higher laboratory costs, greater data management requirements, and more sophisticated fertilizer application equipment. The relative costs of the systems were compared, using prices taken from current laboratory analysis price lists and a quoted VRT application premium. The sum of these costs is referred to in the results as the sampling and application cost. For the uniform rate, the sampling cost (for eight soil samples) is $1.80 per acre and an air-flow application charge of $3.50 per acre for a total of cost of $5.30 per acre. A 2.5-acre grid pattern requires 16 samples and has a sampling cost of $3.60 per acre and a VRT application premium of $5.00 per acre for a total cost of $8.60 per acre. Other variable costs, such as limestone, anhydrous ammonia, seed, pesticide, machinery, labor, drying, interest, and capital costs, were obtained from the *Crop and Livestock Budgets: Examples for Illinois* (1993).

Procedures

The analyses undertaken in this research are based on various samples of the 253 soil tests representing the 40-acre field. In the uniform-rate fertilization scenario, a median soil-test level is calculated for the entire field and a single fertilizer blend is applied everywhere. For the first VRT comparison, the 253 data points were divided according to a 4 × 4 grid pattern, producing 16 squares; each represented 2.5 acres and contained 16 of the original 0.156-acre cells. By calculating the median value of the 16 original test points within each of the larger 2.5-acre cells, a single soil test was obtained for each of the 16 map areas. The VRT simulation prescribed and applied fertilizer to each of these 2.5-acre map areas separately. Plant response and year-to-year fertility changes were then simulated and tracked at the more intensive 0.156-acre level.

To compare VRT and uniform-rate fertilization, a buildup program was used with P and K target levels of 40 and 300 pounds, respectively. These recommendations were based on the *Illinois Agronomy Handbook*. The scenarios that were modeled build and maintain the soil to the desired test levels over four years. When VRT map areas have fertility levels sufficiently above the recommended target level, no fertilizer is recommended. While the buildup program *raises* soil fertility, the maintenance fertilizer simply replaces the P and K used by the crop. Maintenance fertilizer prescriptions are computed by multiplying the expected corn yield by fertilizer replacement factors of 0.43 pounds of P and 0.28 pounds of K per bushel of corn (*Illinois Agronomy Handbook*).

Prescribed P and K levels are applied to each of the 0.156-acre grid cells every other year, following the fertility recommendation for each VRT map area or for the entire field, depending on the fertilizer application technology being modeled. Conversion factors from the *Illinois Agronomy Handbook* indicate that 9 pounds of phosphate fertilizer are required to raise the P level in soil by 1 pound; 4 pounds of potash are required to raise K levels in the soil by 1 pound.

With new fertility levels available in the field, the corn yield is calculated for each 0.156-acre grid cell by adjusting the 150 bushel-per-acre potential yield by the influence of any fertility limitations. The relationships between potential yield and the soil-test levels for P and K are found in the *Illinois Agronomy Handbook*. An overall yield adjustment for each grid cell is calculated by multiplying the adjustments for P and K together.

Based on the computed corn yield and an assumed market price of $2.25, a gross return is calculated for each grid cell. Net returns are then computed, accounting for P and K costs, other variable costs (such as limestone, anhydrous ammonia, seed, pesticide, machinery, labor, drying, interest, and capital costs), and the cost differences between VRT and uniform rate fertilization programs.

Our second objective is to compare the economic outcomes of using VRT with different levels of precision. This comparison was done by repeating the process used for the 4 × 4 simulation except that a less intensive 8 × 8 grid and then a more intensive 2 × 2 grid were modeled. These grids represented 10- and 0.625-acre VRT map areas, respectively. Again, to select one soil test to represent each of these map areas, we calculated the median soil-test levels found within each of the respective grid cells. These alternative VRT intensities were analyzed using the same procedures used for the 4 x 4 pattern, except that different sampling costs are used to compute net returns because the costs of soil sampling and analysis increase as sampling intensity increases.

All analyses were simulated over a 24-year time horizon, and the net present value (NPV) of the returns was calculated to permit comparison of the various scenarios. A 24-year time horizon was chosen because it approximates the length of a land mortgage and it is divisible by a four-year buildup program. The model assumes that the field is resampled every four years and that new P and K levels are prescribed.

Results

The results displayed in Table 1 show that using VRT (assuming the commercially available 2.5-acre grid size) produced a lower average yield as well as lower gross returns, net returns, and net present value than the uniform-rate fertilization. VRT did incur lower phosphorus fertilizer costs.

Table 1 also compares the average variable costs, returns, yields, and NPV of returns for alternative VRT intensities. Average gross returns are highest for the 10-acre sampling scheme and lowest for the 2.5-acre sampling scheme. The 10-acre and the 2.5-acre grids have the highest average P and K costs, respectively. However, both the average net returns and the NPV of returns are highest for the 10-acre samples and lowest for the 0.625-acre samples. These results appear at least partly driven by the average costs of the sampling schemes, however, other grid sizes may reveal that an untested sampling pattern outperforms the 10-acre grid.

These results suggest that uniform-rate application produced marginally higher average returns and NPV of returns over the 24-time period than VRT of any intensity. Above all, the framework highlights the fact that sampling patterns, initial fertility levels, and yield response assumptions interact to determine the optimal fertility program and the advantages of various application options.

Conclusions

This study compares the economic implications of VRT systems using different levels of precision in both mapping and fertilizer application, including a system that uniformly applies a single average rate of fertilization. The initial results shown in Table 1 seem to indicate that VRT is marginally less profitable than uniform-rate fertilization and that using a VRT system with a 10-acre sampling intensity may be more profitable than more intensive sampling. However, the results do not overwhelmingly favor uniform-rate fertilization and it is possible that the results are circumstantial, so be sure to interpret the results carefully.

Table 1. Average Annual Results Per Acre Over 24 Years for VRT Versus Uniform Fertilization

			VRT sampling intensities[a]		
	Units	Uniform rate	10 acre	2.5 acre	0.625 acre
Gross returns	$/acre	$329.47	$330.06	$328.78	$329.59
Phosphorus (P)[a]	$/acre	15.48	15.48	14.96	14.67
Potassium (K)[a]	$/acre	5.46	5.61	5.54	5.43
Sampling and application cost[b]	$/acre	2.20	2.70	3.40	6.10
Other variable inputs[c]	$/acre	213.95	214.10	213.99	214.17
Net returns	$/acre	92.30	92.13	90.88	89.20
NPV of net returns	$/acre	959.84	956.35	945.06	927.13
Yield	bu/acre	146.43	146.69	146.13	146.48

[a]Target levels for P_1 and K soil tests are 40 pounds and 300 pounds, respectively.
[b]Soil testing every four years, P and K application every other year.
[c]Other variable costs include anhydrous ammonia, lime, seed, pesticide, machinery, labor, drying, interest, and capital costs.

Initial conditions. Yield responses and the relative magnitude of costs and returns undoubtedly vary with the initial level of fertility found in a field. We have examined only two fields to date and report only one here. Other fields with higher or lower initial fertility could produce significantly different results.

Spatial variability. The word "spatial" refers to space, so "spatial variability" refers to how much difference is observed in soil fertility *and* the pattern of those differences across the field. The ability to measure and manage this "spatial variability" depends on both the actual fertility patterns that exist and the detail at which we try to examine them. Closer examination captures more spatial variability but at a greater cost. In our procedures, the 0.156-acre original sampling scheme was assumed to be the complete and accurate picture of soil fertility. However, it is possible that significant differences in fertility exist in areas between even those sampling points. The likelihood and importance of large differences in fertility occurring within very short distances may increase with no-till farming, in which the soil is not stirred. More research is needed in assessing how field properties vary across space and how such variations affect intended management results.

VRT capabilities. Some technical capabilities of VRT that could influence crop production and profitability were not included in this analysis. For example, only P and K are considered in this study while limestone (to control pH), nitrogen level, and distribution of some crop pests certainly exhibit spatial variation within fields and may be more important in enhancing site-specific yields. Being able to model a more sophisticated VRT system prescribing and applying other production inputs could change the economics drastically. Also, the soil sampling intensity currently used and VRT's application abilities may not be at a small enough scale to capture and manage the real spatial variability in the field.

Biophysical processes. Perhaps most troublesome in attempting to draw conclusions from our analysis is our level of uncertainty concerning the agronomic responses and relationships underlying our modeling efforts. The economic results (especially when time is explicitly included) are crucially dependent on the agronomic yield response model being assumed. Although the model being used is currently the general basis for most fertility management in Illinois, it could lack the specificity necessary for use in this kind of computer simulation.

Caution should be used when deciding whether or not to adopt VRT. Our results indicate that compared to a uniform application of fertilizer, VRT has lower average net returns and a lower NPV over a 24-year period for the particular field we sampled. Most of the difference between VRT and uniform rate application is due to the higher costs of collecting more soil samples and the expense of the more sophisticated application machinery associated with VRT. The costs of VRT are too high relative to the fertilizer savings and/or yield increases resulting from its use on this field. If the sampling and application costs for VRT decrease in the future, VRT will become more competitive with uniform-rate application.

An obvious qualification of these results is that other fields may produce significantly different outcomes. Other fields may have very different initial levels and different spatial patterns of fertility. In an effort to examine some of these differences, we repeated the analyses first with the fertility levels lowered by about 30 percent and then with the range between high and low fertility increased by around 20 percent. Lower initial fertility levels did not change the relative performance of uniform application and VRT. The uniform application remained more profitable. However, increasing the range of fertility levels within the field shifted the comparison in favor of VRT. These results suggest that in some patterns of variability, VRT pays off. We recommend that a farmer know beforehand that there is a significant problem with the variability of fertility in a field before considering VRT.

In the final analysis, the profitability of VRT relative to a uniform application rate must include the cost of collecting, analyzing, and mapping soil samples and the cost of the application equipment relative to the reduced cost of over- and underfertilization, the potential for yield increases, and the personal value that is placed on spatially precise application of inputs.

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Issue 93-15 *October 1993*

Land Values in the Fall of 1993: Marginal Prices Versus Average Values

Land prices in the Midwest have been rising since a low point in the fall of 1986. According to the latest data from the Federal Reserve Bank of Chicago, farmland prices rose about 5 percent from July 1, 1992, to July 1, 1993. That increase amounts to $100 per acre on $2,000-per-acre land and probably is an accurate reflection of what's going on across the state. Certainly, we have no better systematic data than that: our data is derived mainly through observation and reports to us from brokers and other people around the state. My impression is that prices of better-quality land have gone up more than 5 percent and prices of lower-productivity land (that often has conservation problems and is more difficult to farm) has been about steady. Two or three sales of strictly agricultural land in different locales around the state have topped $3,000 per acre. This kind of information seems to be having a strong effect on expectations of prospective sellers. Not much high-quality land is being sold, but this is fairly normal given past market history and psychology in the midst of a rising market.

As in the past, momentum will likely carry land prices too high. Momentum in a thin market often results in volatile prices up and down. As we discovered a decade ago, land prices went too high in the late 1970s and dropped too low in the mid-1980s. Many buyers learned very painful lessons when land prices topped out at around $4,000 per acre in the last price run-up. The increase in interest rates in 1980 to 1982 bankrupted many because they could not hold on to land at the high price they paid in addition to meeting inflated mortgage payments. The land price increase in the last five years has been more orderly and is generally supported with good earnings coupled with lower interest rates.

The traditional capital asset formula for land is $V = I / R$ where V is the value, I is the income, and R is the capitalization rate. Mathematically, this is simple and straightforward. If income increases, land value will increase. If the capitalization rate decreases, land value will increase, with the reverse effect also being true. Income is the net income to the land after all production, labor, management, and land taxes are paid. The capitalization rate is the acceptable rate of return to investors in land. The capitalization rate is certainly influenced by the rate of inflation; the rate of interest on alternative investments such as CDs, bonds, and stocks; and by the interest rate on borrowed money—namely land mortgages.

Land prices respond to a number of other forces that are absent from the traditional capitalization formula. Some of these absent forces are expectations of future income, interest rates, and availability of land. Rising expectations and momentum are the factors that carried the land market higher than any financial logic would have forecasted in the 1970s. High interest on land debt, general pessimism, and momentum carried land prices down below the level logically justified in the 1980s.

Increased income was the cause for increased land prices from 1971 to 1973, but income has not been the major cause of volatility in the land market since then. As Figure 1 shows, income as measured by the landowner's net return from the traditional 50-50 crop-share lease

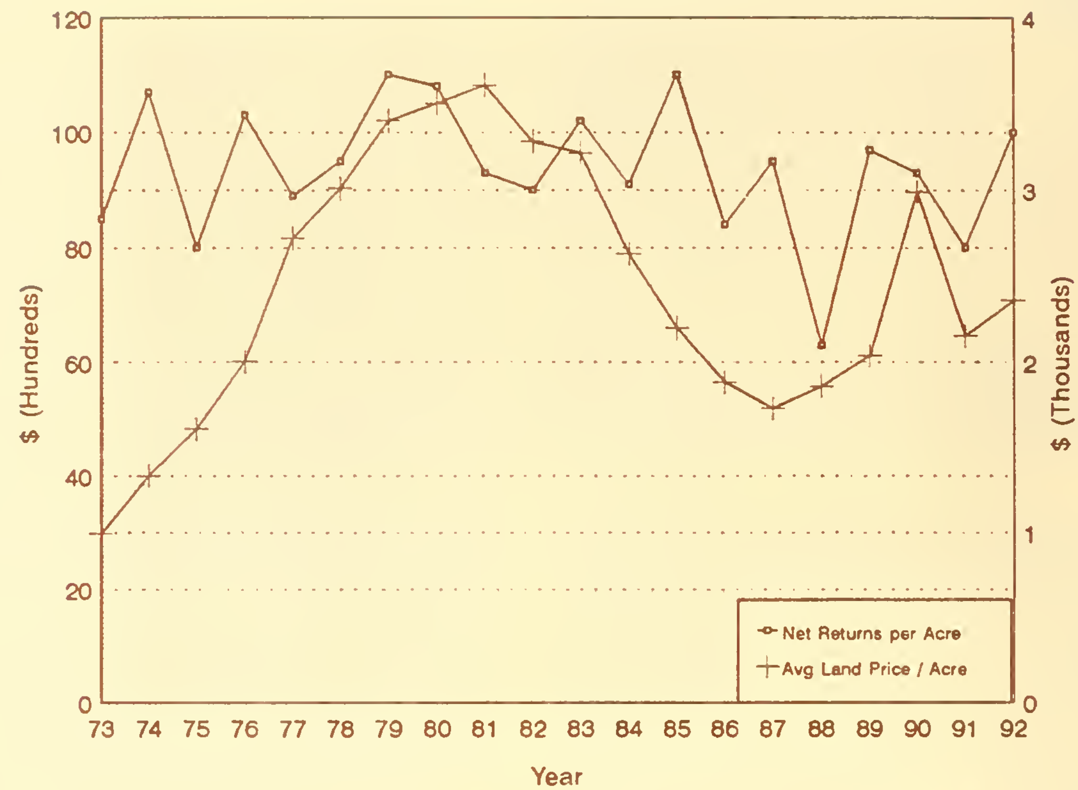

Figure 1. History of returns per acre to landowner and land values on crop-share leased farms with soils rated 86-100.

has been relatively level during the last 20 years (except for normal year-to-year fluctuation and the drought year of 1988), while land prices have been on a roller coaster.

The annual transfer rate (the percent of all land that changes hands each year) generally ranges from 3 to 6 percent, according to courthouse records. This includes land that is transferred among family members by sale and estate settlement, so the amount of land actually entering the market for cash sale is even less. From any perspective this is a thin market. This means that observed prices are marginal prices that do not represent average values for all farmland.

Farmers buy more of the farmland sold than nonfarmers, so many of the land parcels being sold during the last 20 years or more have been added to existing farms for acreage expansion of those farms. Farmers buying farmland have tended to calculate net income from the additional tract of land by using only marginal costs (the additional cost of farming the additional land) rather than average costs which would account more for machinery depreciation, labor and management, or the total costs averaged out over the whole farm. This reinforces the theory that the prices of farmland we observe in the market are marginal prices and not average values. Average values are lower than the marginal prices being paid for land. This land-market structure results in a long-term trend of increasing average farmland value. However, this long-term trend will not exceed the rate of inflation. Assuming the Federal Reserve Bank continues its current policy of a slow increase in the money supply (2 to 4 percent per year), we can expect inflation to remain low during the foreseeable future.

The current change in the lease market is also profoundly changing the land market by becoming one of the forces tending to increase land values through the income part of the capitalization formula. This change in lease structure in Illinois is not obvious, but it is occurring at a more rapid rate. Twenty-five years ago, crops and livestock share leases made up about 90 percent of all leases. The balance of leases was cash-rent. As incomes rose and machinery-size technology allowed acreage expansion, farmers became more competitive to obtain more land. They began offering more cash rent to obtain additional farmland than the land would produce for the landowner on a traditional crop-share lease. Absentee land owners also saw advantages in the cash-rent lease relative to the crop-share lease.

Changing the cost sharing or changing the shares in the crop-share lease did not keep pace with the higher rents being paid on cash-rent farms compared to the crop-share lease returns. We now have about 60 to 65 percent of the land rented on a crop-share lease, and the balance is rented on a cash-rent lease of some sort that in general has produced about 20 percent more for the landowner than the crop-share lease. The rate of this trend has speeded up over the last five years or so; this trend will continue so long as crop-share leases are not adjusted to produce a competitive net rent for the landowner.

This change in leasing structure has increased the income portion of the capitalization formula on many farms and is one of the reasons why land prices have been increasing over the last five years and will continue to increase as we get more land which is cash-rent. Twenty-five hundred dollar per-acre land will command at least $140 per-acre cash rent. Subtracting $18 per acre in taxes and some liability insurance, for example, will leave about $120 per-acre net. Some simple arithmetic with the capitalization formula gives us a rate of return of 4.8 percent which is as much as you can get in many money-market securities, also providing an inflation hedge—even though inflation is going to be quite low. A caveat is appropriate: don't get caught in the upward momentum of land buying and become overexposed with debt!

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Issue 93-16 *October 1993*

Illinois Farm Machinery Cost Estimates for 1993-1994

The cost estimates in this newsletter are designed to help establish rental rates for farm machinery. The estimates are determined using economic-engineering formulae and represent our best estimate of typical costs for owning and operating a specific piece of field equipment. The numbers upon which repair costs are based have decreased over the past three years. Therefore, some of the calculated costs are lower than the last cost estimates. There are two types of costs associated with owning and operating a machine: overhead or fixed costs and operating costs.

Overhead Costs

Overhead costs include depreciation, interest, insurance, and housing. These costs are incurred whether or not the machine is used. The following methods were used to compute overhead costs.

Depreciation. Depreciation is equal to the purchase price minus the current value. As a machine gets older, current value decreases, which causes a machine to depreciate. Current value of each machine was determined using the "remaining farm value" formulae published in the *1993 Standards of the American Society of Agricultural Engineers*. Depreciation costs were calculated by subtracting remaining farm value after 10 years of assumed ownership from the purchase price. Depreciation for a specific machine is, therefore, a fixed amount over the 10-year period. However, the depreciation cost per hour or per acre varies with how much the machine is used.

Interest. The interest charge for a year is the interest rate, as a percentage, multiplied by the remaining farm value of the machine at the beginning of the year. The interest charge is accumulated for 10 years, and the total is used to calculate the interest charge per hour or per acre of machine use.

Housing. Storing machines in a shelter has been shown to increase machinery life and resale value. For this reason, a charge is made for shelter whether or not a shelter is used. The charge is 1 percent of the remaining farm value of the machine.

Insurance. As with housing, a charge is made whether or not insurance is purchased. If insurance is not purchased, the owner takes the risk of loss. The charge for insurance is assumed to be one-half of 1 percent of the remaining farm value of the machine.

The total overhead cost is the sum of the costs for depreciation, interest, housing, and insurance.

Operating Costs

Operating costs are the costs that occur when a machine is used. They include fuel, lubrication and filters, maintenance and repair, and labor.

Fuel cost. Fuel cost is calculated by multiplying the price of fuel by the estimated fuel consumption. The price of fuel is assumed to be 90 cents per gallon for diesel fuel. Fuel consumption is estimated using a formula published in the *1993 Standards of the American Society of Engineers.*

Lubrication costs. Lubrication costs, including filters, are assumed to equal 15 percent of the fuel cost.

Repair and maintenance costs. These expenditures include labor for replacement parts and reconditioning renewable parts. Repair costs for a machine are highly uncertain. Repair and maintenance costs are estimated using a formula published in the *1993 Standards of the American Society of Agricultural Engineers*. The formula is based on actual surveys of repair costs for farm machines and on estimates provided by engineers. Over the last several years, the repair coefficients determined by these formulae have decreased, lowering the cost of repairs and maintenance.

Labor cost. Labor cost is assumed to be $10.00 per hour, up from $8.50 in 1990. Labor time is assumed to be 10 percent greater than actual machine time.

The total cost for operation is the sum of the total overhead cost and the total operating cost.

Cost for Various Operations

Over the last several years, annual use of farm equipment has decreased. In the early 1970s, average annual tractor use was between 400 and 500 hours per year. With the adoption of conservation tillage and tremendous increases in equipment size, annual use has decreased significantly. As annual equipment use decreases, the cost per unit of use increases. The cost increase should be reflected in rental rates. Table 1 includes estimated costs for different numbers of hours of annual use.

For tractors, high use has been set at 500 hours per year, medium use at 300 hours per year, and low use at 100 hours per year. Tillage and related equipment is assumed to be used 25 percent of the number of tractor hours and planting and related equipment 20 percent of the number of tractor hours.

Other assumptions include:

- purchase price = 90 percent of list price
- diesel fuel cost = 90 cents per gallon
- real interest rate = 5 percent
- housing and insurance = 2 percent of remaining farm value
- labor cost = $10.00 per hour
- labor time = 110 percent of tractor time

Tractor Costs

Tractor cost figures in Table 2 include estimated overhead costs and costs for repair and maintenance, insurance, and shelter. The costs do not include fuel and labor costs.

Harvesting Costs

Harvesting equipment costs in Table 3 have been calculated assuming the combine is used 250 hours per year with 150 of those hours used to harvest corn and 100 of those hours used to harvest soybeans and small grain. Useful life is figured to be 10 years.

The higher cost per acre of combining corn with the smaller machine is due to the relatively higher price of equipment cost, labor cost, and reduced efficiency. The lower cost per acre for the big machine is due to the fact that harvesting capacity goes up faster than does the cost of the machine. A middle figure was assumed for the custom rate. A more accurate estimation can be made by matching your machine to the appropriate cost listed in Table 3.

Custom Rates

Custom rates have held steady for the last year. The anticipated increase in fuel costs and the subsequent ripple effect through the economy will probably drive custom rates slightly higher in 1994. As has been explained, the numbers in Table 1 are estimates of costs--both overhead (fixed) costs and operating (variable) costs. They do not include any allowance for operator profit or any payment for management, overhead, or risk. Instead, they serve as a starting point for negotiating a custom rate. Neighborhood rates may or may not cover all these costs. In some rare cases, the prevailing custom rate will be higher than the rates given in these tables. But, because these figures include overhead (fixed) costs, it is unlikely.

It should be noted that most farmers charge less than is needed to recover all their overhead

Table 1. Cost of Ownership and Operation

Farming operation	Units	Medium use	High use	Low use
		-----------------------dollars per unit	-----------------------	-----------------------
Tillage:				
Plowing	acre	**$15.50**	$12.50	$33.50
Chisel plowing	acre	**8.25**	6.50	17.00
Disking	acre	**6.00**	5.00	13.50
Field cultivating	acre	**5.00**	4.00	10.00
Subsoiler	acre	**14.00**	11.00	30.00
Paraplow	acre	**13.50**	10.50	28.50
Combination tillage tool	acre	**7.50**	5.00	16.00
Mulching tillage tool	acre	**7.00**		
Fertilizing, etc.:				
Anhydrous application	acre	**4.50**	3.75	10.00
Fertilizing with "buggy"	acre	**2.75**	2.25	5.75
Spraying	acre	**2.50**	1.75	5.00
Self-propelled sprayer	acre	**2.50**	..	..
Planting and related operations:				
No-till drilling	acre	**13.00**	10.00	30.00
Conventional drilling	acre	**7.50**	6.00	16.00
Planting	acre	**7.25**	5.50	16.00
Cultivating	acre	**4.25**	3.25	9.25
Rotary hoeing	acre	**2.25**	1.75	4.25
Other activities:				
Shredding stalks	acre	**6.75**	5.25	14.00
Manure spreading[a]	hour	**36.00**	..	..
Grain harvest:				
Combining corn	acre	**27.00**	..	..
Combining small grain	acre	**20.00**	..	..
Combining soybeans	acre	**20.00**	..	..
Drying grain[b]	per point	**0.024**	..	..
Hauling grain (one way)[b]	bu/mile	**0.012**	..	..
Storing grain[b]	bu/mo.	**0.024**	..	..
Forage harvesting:				
Forage chopping[c]	acre	**37.00**	27.00	92.00
	ton	**2.00**	1.50	5.00
	hour	**66.00**	..	..
Forage hauling, blowing[b]	hour	**20.00**	..	..
Mowing hay (disk mower)	acre	**12.50**	10.00	26.00
Mowing hay (sickle bar)	acre	**9.50**	..	..
Mowing/conditioning hay	acre	**8.00**	6.00	18.00
Raking hay	acre	**7.00**	6.00	15.00
Square hay baling	bale	**.34**	..	..
Round hay baling	bale	**6.30**	..	..
Large square baling	bale	**14.00**	..	..
General mowing	acre	**12.00**	10.00	24.00
	hour	**31.00**	19.75	77.00

[a]350-bu spreader, 110-hp tractor.
[b]Taken from *1993 Iowa Farm Custom Rate Survey*.
[c]155-hp tractor, 3-row chopper, 75 hr/yr.
NOTE: The figures in Table 1 do not include profit, overhead, or a charge for risk. Act accordingly as you set your own custom rates.

Table 2. *Cost per Hour of Owning and Operating Field Tractors*

Equipment	Annual use 100 hours	300 hours	500 hours	List price
	--------------	*dollars per hour*	------------	
66 pto hp tractor, no cab	$32.49	$11.48	$7.65	$34,600
85 pto hp tractor, no cab	34.55	12.20	8.14	36,800
105 pto hp tractor	36.64	12.94	8.63	39,000
110 pto hp tractor	52.89	18.68	12.47	56,400
125 pto hp tractor	58.67	20.73	13.84	62,600
145 pto hp tractor	62.84	22.20	14.82	67,000
155 pto hp tractor	65.40	23.10	15.42	69,700
175 pto hp tractor	73.30	25.90	17.29	78,200
200 pto hp tractor, 2WD	85.42	30.17	20.13	91,000
206 pto hp tractor, 4WD	83.67	29.55	19.73	89,200
256 pto hp tractor, 4WD	101.11	35.72	23.66	107,000
297 pto hp tractor, 4WD	128.68	45.46	30.30	137,000

Table 3. *Cost of Owning and Operating Harvesting Equipment*

Item	Total costs per acre	Machine costs per acre	Labor costs per acre	Acres per hour	Hours per year	Effi-ciency	List price
140-hp combine					250		$82,000
4-row corn head	$32.71	$27.72	$4.99	2.21	150	65.0	15,900
18-ft. grain platform	18.73	15.96	2.77	3.97	100	65.0	13,300
180-hp combine					250		101,900
6-row corn head	26.79	23.47	3.32	3.31	150	65.0	21,500
20-ft. grain platform	19.87	17.38	2.49	4.41	100	65.0	14,100
215-hp combine					250		117,800
8-row corn head	23.46	20.47	2.49	4.41	150	65.0	28,000
22-ft. grain platform	20.31	18.04	2.27	4.85	100	65.0	14,800

(fixed) costs. If farmers do not charge enough to cover all costs, their custom work won't break even, let alone make a profit.

Remember, actual custom rates and total cost may be different.

A more detailed breakdown of costs, cost determination data, and alternative cost determination data is available in your Extension Unit Office.

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FARM ECONOMICS Facts & Opinions

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Issue 93-18 *December 1993*

Farm Programs for 1994

Most farm programs during 1994 are authorized under the 1990 farm bill (officially the Food, Agriculture, Conservation, and Trade Act of 1990), the Budget Reconciliation Act of 1990, the Fiscal 1994 USDA funding bill, and the 1993 Budget Reconciliation for the next five years. They will be implemented by rules and regulations from the U. S. Department of Agriculture.

Feed Grains

Target prices, established under the 1990 Food, Agriculture, Conservation, and Trade Act are: corn, $2.75; sorghum, $2.61; barley, $2.36; and oats, $1.45. Deficiency payments are to be made on 85 percent of the crop acreage base less any acreage reduction. Because the acreage reduction is 0 percent, a producer who plants his full acreage base could qualify for payments on 85 percent of the base. If a farmer plants less than 85 percent of the crop acreage base, then that acreage planted will be used in calculating the amount of the deficiency payment.

The 1994 feed grain program will have an acreage reduction requirement of 0 percent. Under this program, producers of corn, grain sorghum, barley, and oats will be eligible for deficiency payments and commodity loans if they plant no more than their farm program acreage base.

Although the preliminary announcement proposed an acreage reduction of 5 percent for corn and 0 percent for grain sorghum, barley, and oats, the adjustment to 0 percent for corn was made before the November 15 deadline because the 1993 corn crop estimate was reduced and projected stocks were expected to fall to the lowest amount since 1975.

To qualify for program benefits under the 1994 program, producers will be required to sign up to indicate their intentions to plant within their acreage base and later to verify their actual plantings by dates that will be announced later. It is expected that the intentions-to-plant period will be in March and April.

Wheat

The target price for wheat established under the 1990 farm bill is $4.00 per bushel. The acreage reduction for 1994 will be 0 percent. Payment acreage will be 85 percent of the crop acreage base.

Soybeans and Other Oilseeds

The national average price support rate for 1994 crop soybeans is $4.92 per bushel, and other oilseeds will be 8.7 cents per pound. Soybean or oilseed rates vary among counties and is based on the county where that quantity is stored. Loan rates will be announced later.

National Soybean Referendum. Soybean producers will determine whether the nationally legislated Soybean Promotion and Consumer Information Program will be continued in a referendum on February 9. Registration and voting will take place at Cooperative Extension unit offices. ASCS offices will determine eligibility of challenged voters, count ballots and report the results.

All producers who certify that they produced soybeans between September 1, 1991 and December 1, 1993 will be eligible to vote in the referendum. A simple majority vote will determine if the soybean promotion program will stay in effect. In their vote, producers will decide if they want to continue to pay the current assessment of 1/2 percent of the market price of the soybeans they sell. The assessments are used to fund the program.

Farmer-Owned Reserve

No 1993 wheat will be allowed into the farmer-owned reserve. Due to rising prices and a tight supply/demand situation relative to the trigger prices, conditions do not exist to allow entry of wheat in the reserve. The 90-day average market price for wheat on December 14 was $3.31 per bushel, which was much higher than $2.94, 120 percent of the wheat price-support rate. The estimated 1993-94 estimated wheat ending stocks-to-use ratio is 26.8 percent, much less than the 37.5 percent needed to allow entry.

The market price for corn was equal to or exceeded 95 percent of the corn target price ($2.61 per bushel) so USDA announced that storage payments were stopped on November 18 for corn in the farmer-owned reserve. The nonstorage earning period will continue until prices have been below the stop storage payment level for more than 90 consecutive days. Sorghum and wheat prices are also above 95 percent of the target prices and grain reserve storage payments have also been discontinued.

Producers will receive storage payments earned prior to the November 19 announcement. Producers may also continue to market corn pledged as collateral for these loans.

Conservation Programs

In the 1993 budget reconciliation, enrollment of land into the Conservation Reserve Program (CRP) was capped at 38 million acres. At the time, there were 36.5 million acres already enrolled, and 1 million acres were reserved for enrollment during 1995. So the most that could be enrolled since the budget act passed is 500,000 acres.

Enrollment into the Wetland Reserve Program (WRP) was set at a minimum of 330,000 acres through 1995. Part of this acreage could be enrolled in 1994.

The Agricultural Conservation Program will operate in Illinois. Funds are to be used to control erosion, conserve water, and improve water quality. The total allocation includes funds for annual and long-term conservation agreements. Applications for cost-sharing should be made through county ASCS offices.

Disaster Programs

Producers suffering a loss to their 1993 crops in excess of 65 percent must purchase crop insurance for their 1994 crop to be eligible to receive disaster assistance for any 1993 loss. Crop insurance obtained under the Group Risk Plan (GRP) where available, at any amount of coverage, satisfies crop-insurance linkage requirements to obtain disaster assistance.

A producer may apply for a waiver of the crop-insurance requirement if it would impose an undue financial hardship. The county ASCS committee would decide whether to grant the exemption.

Because of the conditions on lands flooded during 1993, special rules will give producers the necessary flexibility for planning purposes to rehabilitate cropland affected by the flood. These rules may waive land eligibility requirements for the Agricultural Conservation Reserve and Conservation Use acreage, and cover crop requirements. Practices necessary to restore the cropland to productive capabilities will be permitted. Illinois is one of nine states in which these special rules apply. The application period for 1993 disaster-related crop production and quality losses began July 22 and ends March 4. The total amount of payments and benefits a person may receive for losses may not exceed $100,000 for crop losses and livestock feed program benefits combined.

Livestock feed program benefits may not exceed $50,000 for the crop year.

Tree Assistance Program

Tree growers who experienced significant tree losses in 1993 due to damaging weather, including floods and drought, may apply for aid under the Tree Assistance Program. The program provides for up to 65 percent of the average reestablishment costs for any loss that exceeds 35 percent of the stand after adjustment for normal mortality. Payments may also be reduced due to funding limits. Eligibility is restricted to owners of 500 acres or less of orchard trees and 1,000 acres of forest trees, and those who have less than $2 million gross revenue in the preceding year in which the losses occurred. Payments may not exceed more than $25,000 per person.

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Issue 94-1 *March 1994*

Revenue Assurance: A New Farm Program Approach

A coalition of Iowa farm and agribusiness organizations has formed the Iowa Farm Bill Study Team. They have developed a new farm program proposal, a "revenue assurance" plan. They are presenting their plan to farm groups around the country, hoping that it will get serious consideration when the 1995 agricultural and food legislation is written.

This plan certainly does not get government out of the farm income support business. But it does propose major changes in the way that farm income support payments would be distributed. Looking ahead to major farm and food legislation in 1995, this proposal aims to improve the safety net under farm production and improve the economic climate in rural areas.

Current Program Weaknesses

Current programs are viewed as protecting program crops but not necessarily farm income. The study team condemns set-asides and acreage reduction programs for failing to curtail worldwide production, saying that they are complicated to regulate, costly to administer, and are failing to increase program commodity values.

They claim current agricultural programs are "paying producers not to produce" although many would disagree with this idea. Current programs are labeled as unfair to livestock producers. They have also failed to promote best management practices by promoting maximum program crop production. Weather is blamed for almost all price changes. Communities are harmed because not all farmland is used and some jobs are eliminated.

Assigned bases and yields, because they have been frozen since the early 1980s, are criticized as not necessarily equating the productivity of the land or the individual producer. The study group also sees declining program benefits as deficiency payments are ratcheted down. The federal crop insurance program is viewed as being undermined by emergency disaster legislation.

The Revenue Assurance Approach

The major features claimed for this proposal are:

1. It replaces all disaster programs and modifies the federal crop insurance program by delivering both programs in one comprehensive package.

2. There are no bases, and there is no acreage reduction program of any kind.

3. Over time, each producer develops an average yield for each crop grown on that farm.

4. The Commodity Credit Corporation (CCC) loan program and Farmer-Owned Reserve (FOR) would continue.

5. Each producer is assured a certain percentage of their normal gross crop revenue (possibly 70 percent, but some adjustment would be acceptable).

6. Producers may plant any crop in any amount as long as they comply with their soil conservation plan.

Many benefits can be claimed for revenue assurance:

1. By assuring producers a percentage of their gross revenue, the producers will receive payments when they are most needed. The proposed program will probably pay producers one year out of five instead of almost every year like the current program.

2. Government will be less involved in administration and in influencing management decisions. Proponents claim that the proposed program could be delivered by the same insurance companies that are currently marketing federal crop insurance.

3. The proposed program facilitates use of best management practices. Because some highly erodible land should not be planted to intensive row crops, this program could encourage vegetative cover and not force land into row crops to maintain an acreage base.

4. Land values would become based on production values, not on farm program value.

5. The program would encourage environmental stewardship through more flexibility. This new plan is believed to encourage producers to plant more crops in rotation and add diversity to pest management plans.

6. Instead of relying on farm program payments, the new plan would foster active land-owner participation and interest in income generation and soil stewardship.

The program is viewed as fair and friendly to livestock production.

1. Producers would gain increased ability to manage all facets of the farming operation. If world demand for a crop increases, the markets will tell the producers what, where, and how much of a certain crop to plant. Set-asides will be eliminated, and the new proposal will permit the United States to use its supply to compete with the rest of the world.

2. Cost savings for the government could be considerable if the producer receives a revenue assurance payment only one year out of every five. The payments would go only to producers who have gross revenue below 70 percent, not to all producers.

3. The proposed program encourages maximum producer decisions with an emphasis on economic profitability. Instead of planting to maintain bases and compete with government regulations, the producer would plant crops on the basis of profitability.

4. The proposed program favors neither large nor small farms. Payments are based on a percentage of normal gross revenue, regardless of the size of the operation.

An Old Goal with a New Plan

In some ways, the revenue assurance program attempts to achieve an old goal with a new approach. When the first price support and income programs were passed in the 1930s, their goal was to stabilize prices and incomes. Policymakers at that time decided to support selected commodity prices because supporting incomes seemed too difficult. The vast change in the number and size of farms, the increasing number of part-time farmers, and federal budget deficits have all encouraged the Iowa Farm Bill Study Team to explore new ways to assure stable farm incomes.

Farmers and farm organizations studying this plan should recognize some important features.

1. To implement a revenue assurance plan, each farm would have to establish a revenue base to replace the current crop acreage bases. In the first years, the current farm program yields would be used to calculate a base revenue for the farm but these would be replaced as new yield data become available. With the freedom to shift crop acreages, the revenue base could change considerably over the years compared with the first revenue base established.

The current proposed plan deals with crop production. Does the new plan encourage or discourage livestock production? Where do current and new nonprogram crops fit into the revenue crop base? Will the calculations to establish a revenue base use county average prices? How many years will be used to establish the revenue base?

Forces Influencing Farm Program Changes

Many farm policy decisions in 1994 and 1995 will be strongly influenced by federal budget considerations. Some farmers recognize that the budget squeeze could change their future programs so they prefer to have some voice in making these changes. Since the 1990 legislative reapportionment, agriculture has had less direct political influence, and fewer members of Congress represent districts where farming or agricultural industry is significant.

Rural development is getting increased attention with the realization that present price and income support programs have not helped many rural residents who are not engaged in farming. Programs to increase job opportunities in rural areas will get increasing attention.

Conservation and environmental programs have been added to the major agricultural and food legislation in 1985 and 1990. Conservation compliance, the Conservation Reserve Program, and the Wetlands Reserve Program are examples of increased emphasis on clean air and water. Future programs are likely to place more emphasis on conservation payments and less emphasis on commodity price and income support. Restrictions on large payments to individual farmers will probably continue.

More Proposals Ahead

This revenue assurance plan will be one of many farm program proposals to surface during the coming year. For any policy choice, there are a number of consequences. Any plan should be evaluated on what it is expected to accomplish and what the consequences will be for farmers, consumers, taxpayers, and international customers for U.S. agricultural products.

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Issue 94-2 *March 1994*

MANAGING RISK IN THE 1990'S CROP INSURANCE

Most growers recognize the uncertainty of crop yields, commodity prices, government programs, and the weather that results in fluctuating farm income. The floods of 1993 have further underlined these uncertainties. Modern production agriculture requires major investments in land, machinery, and operating capital, creating large financial risks for many individuals.

Over time, the federal government has operated a variety of programs designed to support and stabilize farm income. These programs, including those of the Federal Crop Insurance Corporation (FCIC) have been a valuable safety net for many growers. Federal budget pressures have fostered a trend towards less support for agriculture, including a major modification of agricultural support systems.

This decreased financial support has caused changes in the traditional concepts of crop insurance and caused the FCIC to introduce new programs. In past years, the FCIC has been synonymous with the concept of multiple-peril crop insurance (MPCI), a program that allows a producer to prove yields on his/her farm and then to insure a portion of this potential yield.

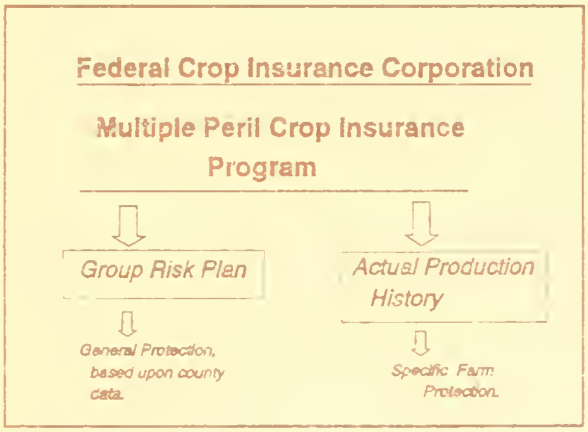

Figure 1. Federal Crop Insurance Corporation

Basic Features of MPCI

Effective in 1994, MPCI consists of two programs. The insurance known as Multi-Peril Crop Insurance is basically unchanged and named Actual Production History (APH). This product will insure specific locations and is based upon actual yields grown on the farm.

In 1993, FCIC introduced an additional product, the Group Risk Plan (GRP). This plan uses countywide data, trend yields built from National Agricultural Statistical Service data (NASS), and indemnifies losses on the basis of annual differences between the average county crop yield and the NASS trend yield. If a farmer's average yield parallels county average yields, going up and down in the same years, GRP is a good risk management tool. If a farmer's average yields do not parallel the county average yields, another risk management tool may be more appropriate. If named perils such as hail are a hazard, specific insurance such as hail insurance may be appropriate.

Actual Production History (APH)

What crops does APH cover?

The Actual Production History (APH) insurance program (formerly known as the multi-peril plan) is offered on all Agricultural Stabilization and Conservation Service (ASCS) crops and is now available on other commercial crops. In most Illinois counties, the crops covered include corn, grain sorghum, soybeans, oats, wheat, and barley. Specialty crops such as hybrid seed corn, apples, green peas, popcorn and sweet corn are also covered.

The APH program is sold by local, independent insurance agents who in most cases sell crop insurance along with other lines of insurance, including specific peril insurance such as hail insurance. Their objective is to provide a full range of insurance protection--from crop insurance to farm and homeowner's policies--to meet farmers' risk management needs.

When a farmer faces a wide range of yield risks, or if the farmer's average yields are not similar to the county average yields, the agent will likely recommend the APH coverage, which provides individual protection on practically all unavoidable causes of loss.

What is covered?

APH covers unavoidable production (yield and quality) losses caused by any adverse weather conditions, including drought, excessive temperature, lightning, flood, hail, wind, and tornado. It also covers unavoidable losses caused by insect infestation, plant disease, wildlife, fire, and earthquake.

APH crop insurance does not cover losses resulting from neglect, poor farming practices, or theft. Some specialty crops may be excluded as well. In addition, there are specific restrictions on some crops based upon acceptable farming practices or upon an individual's loss record. Reduced coverage can be obtained, in the case of late planting, and there is a prevented planting endorsement for some crops. See your insurance professional for the full details of the APH insurance plan.

How much coverage can be purchased?

With the APH plan, there are two decisions that determine the amount of coverage: (1) the level of coverage (that is, the amount of the deductible); and (2) the price at which yields are converted to cash. In 1994, these prices are $5.75 for soybeans and $2.20 for corn.

In past years, APH has been based upon a 10-year average yield, using actual proven yields. Changes have been made so that one can determine a "yield" with fewer years of records. Four years of actual yields will establish an actual production history. With fewer years' records, county averages and ASCS yields are substituted for the missing years' records. Good production records are still very important, (your proven yield will be higher than the calculated yields); however, with the new procedures farmers without good production records will still be eligible to participate.

Level of coverage.

Under APH, you have the option of insuring at 75, 65, 50 or 35 percent coverage level.

(1) 75 percent of your insurance yield (that is, 25 percent deductible),
(2) 65 percent of your insurance yield (that is, 35 percent deductible,
(3) 50 percent of your insurance yield (that is, 50 percent deductible) or
(4) 35 percent of your insurance yield (that is 65 percent deductible).

You can also choose from 30 to 100 percent of an established price election, or you can choose a market-based price election. The amount you will be paid is based upon each bushel of production that is below the guarantee. (Table 1).

GROUP RISK PLAN (GRP)

What crops does GRP cover?

In Illinois, the Group Risk Program (GRP) is offered on corn and soybeans only.

GRP, like APH, is sold by local, private insurance agents who in most cases sell crop insurance along with other lines of insurance. If the farmer's crop history parallels that of the county, the agent will likely recommend the GRP coverage. This coverage will provide inexpensive protection against a countywide catastrophe such as excessive rain or drought.

What causes of yield losses are covered?

GRP will also cover a wide range of yield risks to the extent that these risks affect enough of the county to lower the overall county average yield. It does not insure against a loss of grain quality.

GRP is all-risk coverage based upon the premise that when an entire county's crop yield is low, most farmers in that county will also have low yields. Because GRP indemnifies participating farmers based upon county averages, it is to the farmer's advantage to continue to raise as much crop as possible, whereas in some situations under APH, farmers will "writeoff" the crop and plan on collecting the insurance.

How much coverage can be purchased?

Under the GRP program, three protection levels are available: (1) 150 percent of the county expected yield times the FCIC price, (2) the trend yield times the FCIC price, and (3) 30 percent of the maximum level. The farmer can purchase protection at 90, 85, 80, 75, 70, and 65 percent of these figures. The cost per $100 of insurance and the county expected yield will vary with each county. Consequently, it is important to visit with your insurance professional to determine how this program fits your needs (Tables 2 and 3).

At this writing, both products, GRP and APH, will qualify as meeting the insurance requirement for receiving ASCS disaster payments. GRP may be used as loan collateral as can APH. However, not all lenders may accept GRP as loan collateral so it is important to check with your lender before purchasing GRP to meet this requirement.

When must MPCI be purchased?

Both MPCI plans, GRP and APH, must be purchased by April 15 of the year being insured (April 15, 1994). Most of the other rules that affect MPCI will still pertain to both plans.

DEFINITIONS: (partial listing)

(a) Acreage report. An annual report that you submit stating the net acreage of each insured crop.

(b) Acreage reporting date. The date by which you must submit your acreage report.

(c) Expected county yield. The yield contained in the actuarial table which establishes your coverage for the insured crop year (GRP).

(d) Actual county yield. The actual yield established by NASS. It will be available in November/December for preliminary payment (if any) and in March/April for final payments.

(e) Trigger yield. The result of the expected county yield multiplied by your chosen coverage level percentage. When the final payment yield falls below your chosen trigger yield, a payment is made.

(e) FCIC. The Federal Crop Insurance Corporation, an agency of the United States Department of Agriculture.

(f) GRP. Group Risk Plan of insurance

(g) MPCI. Federally subsidized multiple-peril crop insurance, consisting of the GRP and Actual Production History (APH) plans.

(h) NASS. National Agricultural Statistics Service.

(i) Protection per acre. The dollar amount per acre selected by you for each insured crop practice and type specified. This amount times your net acres is the amount you will receive if the final payment yield is zero (GRP).

(j) Subsidy The amount of your premium that the government will pay. The subsidy is built into quoted rates.

Table 1. MULTI-PERIL PRODUCT COMPARISON

Plan Features	Group Risk Plan (GRP)	Actual Production History Plan (APHP)	Disaster Payments from Congress
Units to be Insured	Whole Farm, Acres of crop	Sub-Farm Units, by county, ownership, crop, etc	Whole Farm Crops grown
Sign-Up Dates	Corn and Beans -- April 15th	Usually April 15th	Enrollment in ASCS programs.
Coverage Levels	65 - 70 - 75 - 80 - 85 - 90 percent of protection level	35 - 50 - 65 - 75 percent of protection level	Actual verified loss below farm program yield or county average yield.
Payment criteria	Yield only	Yield, grain quality	As determined by Congress, tends to be yield only.
Loss Payment Dates	Preliminary in December, Final following April	At time of loss	After loss is verified by ASCS offices.
Premium Payment Dates	October 1 of crop year	October 1 of crop year	None
Maximum Protection	150% of county expected yield times FCIC grain price	75 percent of producers proven yield times FCIC grain price	Individual loss times price specified in legislation.
Claim Trigger	County yield level	Individual farm yields	35% or 40% reduction from ASCS yield, if crop is insured
Payment Limitations	None	None	$100,000
Records needed	None, based upon county yields	Be able to document yields for the last 4 to 10 years	As determined by Congress

Table 2. GRP INSURANCE COST PER ACRE, SOYBEANS, CHRISTIAN COUNTY, ILLINOIS[a] Expected County Yield is 44.4 bu. per acre.						
Coverage Level	90%	85%	80%	75%	70%	65%
Trigger Yield	40.0	37.7	35.5	33.3	31.1	28.9
	Cost per Acre (before subsidy) for:					
Max. Protection: $383 per acre	$8.87	$5.09	$3.22	$2.14	$1.88	$1.61
Mid - Protection: $255 per acre	$5.36	$3.39	$2.14	$1.43	$1.25	$1.07
Min. Protection: $115 per acre	$2.41	$1.53	$0.97	$0.64	$0.56	$0.48
RISK						
Insurance Cost/$100	$2.32	$1.33	$0.84	$0.56	$0.49	$0.42
Subsidy per Acre (Max Protection)	$2.62	$2.18	$1.38	$0.92	$0.80	$0.69
Chance of projected loss.	27/100	18/100	11/100	7/100	4/100	2/100

Table 3. GRP INSURANCE COST PER ACRE, CORN, CHRISTIAN COUNTY, ILLINOIS[a] Expected County Yield is 151.3 bu per acre						
Coverage Level	90%	85%	80%	75%	70%	65%
Trigger Yield	136.2	128.6	121.0	113.5	106.0	98.4
	Cost per Acre (before subsidy) for:					
Max. Protection: $499 per acre	$13.76	$8.38	$6.29	$4.19	$2.79	$2.45
Mid - Protection: $333 per acre	$8.16	$5.59	$4.20	$2.80	$1.86	$1.63
Min. Protection: $150 per acre	$3.67	$2.52	$1.89	$1.26	$0.84	$0.73
RISK						
Insurance Cost/$100	$2.75	$1.68	$0.84	$0.56	$0.49	$0.42
Subsidy per Acre (Max Protection)	$3.70	$3.59	$2.69	$1.80	$1.20	$1.05
Chance of projected loss.	27/100	18/100	11/100	7/100	4/100	2/100

[a]Output from an actual case, flat black highly productive soils in central Illinois, based upon 100 acres, $300 per acre total coverage and 90% protection level.

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Issue 94-3 *May 1994*

Cost of Growing Corn and Soybeans in 1993

In 1993, the total of all economic costs per acre for growing corn in Illinois averaged \$355 in the northern section, \$366 in the central section with higher soil ratings, \$334 in the central section with lower soil ratings, and \$294 in the southern section. Soybean costs per acre were \$285, \$300, \$271, and \$236 respectively (Table 1). Costs were lower in the southern section primarily because land costs are lower there. The total of all costs per bushel in different sections of the state ranged from \$2.24 to \$2.77 for corn and from \$5.76 to \$6.12 for soybeans. Variations in cost were related to weather factors, yields, and land quality.

These figures were obtained from farm business records kept by farmers enrolled in the Illinois Farm Business Farm Management Association. The samples included only farms with more than 260 acres of productive and nearly level soils in each area of the state; these are farms without livestock. Farms located in 22 counties north and northwest of the Illinois River are included in the sample for northern Illinois. Farms from 36 counties below a line from about Mattoon to Alton are in the sample for southern Illinois. The remaining 44 counties make up the sample for central Illinois (Figure 1). The sample farms averaged 776 tillable acres in northern Illinois, 836 acres in the central section with high soil ratings, 800 acres in the central section with lower soil ratings, and 1,035 acres in southern Illinois.

This economic analysis includes some factors in the cost of doing business that nonagricultural businesses may not include. These factors are not used as expense items on income tax

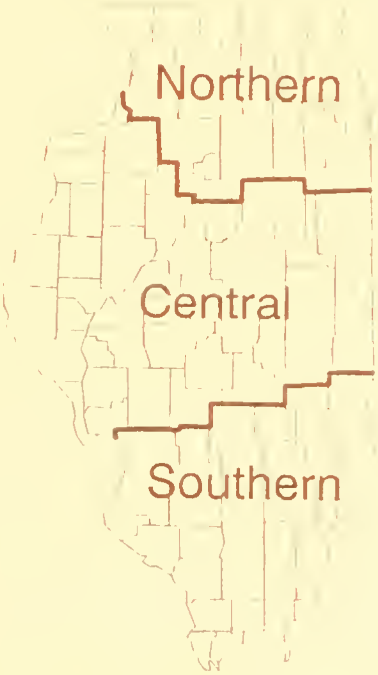

Figure 1. Geographical distributions of farms in this study.

returns. Examples include the charge for labor performed by the farm operator, a rental charge for the use of owned and rented land, and an interest charge on equity in machinery and inventories of grain and livestock. In the short run, farm operators may continue to produce without covering these total economic costs of production. However, if returns do not equal the total economic cost of production in the long run, it will be difficult to maintain the same level of resources in the farm firm. In addition, producers will be challenged to lower

Table 1. Cost per Acre of Growing Corn and Soybeans on Illinois Grain Farms Without Livestock in 1993

	Corn				Soybeans			
	North	Central[1]	Central[2]	South	North	Central[1]	Central[2]	South
Number of farms	364	588	275	243	364	588	275	243
Acres in crop	402	395	367	395	291	385	358	415
Nonland Costs								
Variable costs:								
Soil fertility	$48	$ 51	$ 49	$ 52	$ 15	$ 17	$ 16	$ 18
Pesticides	27	26	25	25	28	28	27	27
Seed	26	24	24	21	13	14	13	14
Drying and storage	13	14	12	6	5	6	6	2
Repairs, fuel, and hire	32	29	29	35	26	24	25	30
Total, variable costs	$ 146	$ 144	$ 139	$ 139	$ 87	$ 89	$ 87	$ 91
Percent change from 1992	3	3	4	8	6	7	7	11
Other nonland costs:								
Labor	$ 30	$ 31	$ 31	$ 30	$ 29	$ 29	$ 28	$ 29
Buildings and storage	9	7	5	6	6	4	3	3
Machinery depreciation	26	26	26	28	21	22	22	23
Nonland interest	19	21	14	14	17	19	13	13
Overhead	14	14	15	11	14	14	14	11
Total, other costs	$ 98	$ 99	$ 91	$ 89	$ 87	$ 88	$ 80	$ 79
Total, nonland costs	$ 244	$ 243	$ 230	$ 228	$ 174	$ 177	$ 167	$ 170
Percent change from 1992	6	7	7	13	7	11	11	16
Land costs								
Taxes	$ 18	$ 20	$ 16	$ 8	$ 18	$ 20	$ 16	$ 8
Annually adjusted net rent	93	103	88	58	93	103	88	58
Total land cost	$ 111	$ 123	$ 104	$ 66	$ 111	$ 123	$ 104	$ 66
Total, all costs	$ 355	$ 366	$ 334	$ 294	$ 285	$ 300	$ 271	$ 236
Percent change from 1992	6	6	8	12	7	9	10	13
1993 yields, bushels per acre	128	151	132	131	47	49	45	41
Nonland cost per bushel	$1.91	$1.61	$1.74	$1.74	$3.70	$3.61	$3.71	$4.15
Total, all costs per bushel	$2.77	$2.42	$2.53	$2.24	$6.06	$6.12	$6.02	$5.76
1990-1993 average yield	131	152	131	123	45	48	43	39
Nonland cost per bushel	$1.86	$1.60	$1.76	$1.85	$3.87	$3.69	$3.88	4.36
Total, all costs per bushel	$2.71	$2.41	$2.55	$2.39	$6.33	$6.25	$6.30	$6.05

NOTE: The entries shown below the line are costs based on 1990-1993 average yields.

[1]Soil productivity ratings of 86 to 100

their cost of production and/or increase volume as profit margins remain narrow.

Nonland Costs

Soil fertility costs for soybeans were allocated on the basis of phosphorus, potassium, and lime removal, with the residual cost allocated to corn. The seed, crop, pesticide, and drying expenses also included some commercial drying and storage and the estimated value of home-raised seed. The costs of fuel, machine hire, and machinery repair were reduced from income received for custom work. Labor costs included the cash value of hired labor, plus a charge for available unpaid labor at a rate of $1,575 per month. This rate represents a charge for only the physical labor input, not including a charge for management. Building and storage costs were for repairs and depreciation only. The nonland interest rate in 1993 was set at 7 percent; this figure was then multiplied by the sum of half the average inventory value of crops at the beginning and the end of the year, the depreciated value of machinery and buildings, and half the total operating expenses. The result is the total nonland interest charge. Overhead costs included insurance, utilities, the farm share of light vehicle expenses, and miscellaneous items. As mentioned above, no charge has been made in this analysis for management, but it may normally be about 7 percent of the total cost per bushel, or 15 to 20 cents for corn and 35 to 40 cents per bushel for soybeans.

Land Costs

Land costs included the adjusted net rent and the real estate taxes. Net rent was represented as the average rent received by crop-share landlords on record-keeping farms for the period 1989 to 1992. Caution is needed in interpreting differences in land costs between areas. In the long run, the net rent residual return to landowners should tend to equalize the total cost of production.

Cost per Bushel

Production costs per bushel of corn increased in 1993 for all areas of the state compared to 1992 due to lower yields and increased costs. The increase in costs per bushel ranged from $0.47 in the central Illinois section with the higher soil rating to $0.57 in northern Illinois. The average corn yield in 1993 was 24 bushels per acre lower than 1992 in northern Illinois, 21 bushels lower in southern Illinois and 25 bushels per acre lower in central Illinois. The 1993 average corn yield in the different geographical locations was 3 bushels per acre below to 8 bushels per acre above the four-year average from 1990 to 1993. Total costs per acre increased considerably in all areas of the state. All areas of the state incurred higher pesticide, machinery repairs, fuel and hire, nonland interest, and land costs. The increase in machinery repairs and fuel cost can be related to additional tillage that was completed in 1993 that was not done in the fall of 1992 due to wet weather. Machinery depreciation expense also increased significantly. This can be explained by increased machinery purchases and a change in the tax law that increased the amount of capital purchases that can be "expensed" or deducted in the year of purchase from $10,000 to $17,500.

Production costs per bushel of soybeans also increased in 1993 compared to 1992 for all areas of the state. Soybean yields were equal to or only slightly lower than the year before, depending on the area of the state. The increase in costs per bushel ranged from $0.40 in northern Illinois to $1.03 in southern Illinois. Average soybean yields in northern and central Illinois were basically the same, while yields averaged 3 bushels per acre less in southern Illinois. Total costs per acre increased in all areas of the state, ranging from a $19 per acre increase in northern Illinois to a $28 per acre increase in southern Illinois. Basically, the same costs increased for soybeans as for corn. Average soybean yields in the different areas were 1 to 2 bushels per acre higher than the four-year average from 1990 to 1993.

Cost per Acre

Total costs of $346 per acre to produce corn increased significantly compared to the year before and were at the highest level since 1985. Most of the increase was due to higher pesticides, machinery repairs, fuel and depreciation, and land charges. These costs had been declining from 1984 through 1992, decreasing from $364 per acre to $320 per acre (see Figure 2). Most of the decrease during that time occurred in machinery depreciation and interest charges. Cash costs such as fertilizer, pesticides, and seed declined very little during this period. Cash costs of $143 per acre in 1993 were the highest since at least 1981.

Total cost per acre to produce soybeans also increased, from $255 per acre in 1992 to $281

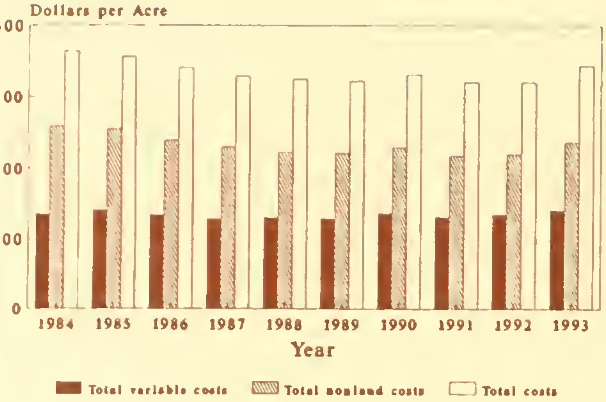

Figure 2. Total costs per acre to grow corn on Illinois grain farms.

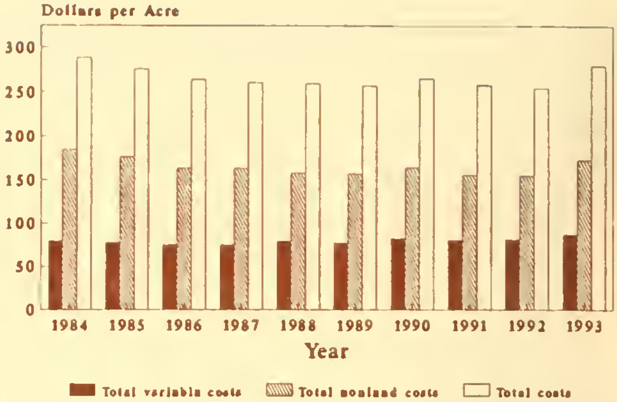

Figure 3. Total costs per acre to grow soybeans on Illinois grain farms.

per acre in 1993 (Figure 3). These costs were at the highest level since 1984 when they were $289 per acre. The same expenses that increased for corn also increased for soybeans. Variable costs of $89 per acre were the highest since at least 1981. Pesticide costs have increased from $16 per acre to $28 per acre during this time span. After an extended period of moderately declining costs per acre during the early and mid-1980s, total costs increased significantly in 1983. Some of the increase in costs can be explained by the wet fall of 1992, which led to more tillage operations completed in 1993. Also, improved farm earnings resulted in increased capital purchases and higher depreciation costs. Time will tell whether we have started an extended period of rising costs or whether the increase costs in 1993 was a one-year aberration.

Cost Comparison

Average cash (or variable) costs per bushel of corn for the five-year period 1989 through 1993 ranged from $0.92 in the central Illinois section with the higher-rated soils to $1.07 in northern and southern Illinois (see Table 2). Total costs per bushel ranged from $2.23 in southern Illinois to $2.58 in northern Illinois. Total costs per bushel were lower in southern Illinois due to a lower land cost.

Average variable costs per bushel of soybeans ranged from $1.73 in the central Illinois section with higher-rated soils to $2.18 in southern Illinois. Total costs per bushel varied from $5.62 in southern Illinois to $5.96 in northern Illinois. Like corn, total costs per bushel were lower in southern Illinois due to lower land cost.

Break-even Requirements

Current selling prices for corn are below the average total 1993 cost of production when using the average yield for the past four years for northern Illinois, near the current selling prices for central Illinois, and above the current selling prices for southern Illinois.

Current selling prices for soybeans are above the total cost of production for all areas of the state when you use the average yield for 1990 through 1993. An owner-operator with average yields during the past four years (1990 to 1993) would need $0.95 to $1.13 per bushel for corn and $1.85 to $2.33 per bushel for soybeans to recover the variable costs listed in Table 1. Recovering the total of all costs would require receiving $2.39 to $2.71 a bushel for corn and $6.05 to $6.33 a bushel for soybeans. Individual tenants and landowners computing the average break-even cost per bushel for growing corn and soybeans should divide the costs and yields shown in the table as they are shared by the terms of the lease.

Impact on Farmland Values

Farmland values generally are related to grain prices and the nonland costs of production because under traditional crop-share leases,

	Corn				Soybeans			
	North	Central[1]	Central[2]	South	North	Central[1]	Central[2]	South
Soil productivity rating	83	93	77	60	83	93	77	60
Yield per acre	133	150	132	123	46	48	44	39
Variable cost per acre	$ 142	$138	$131	$131	$82	$83	$80	$85
Variable cost per bushel	$1.07	$0.92	$0.99	$1.07	$1.78	$1.73	$1.82	$2.18
Total costs per acre	$ 343	$348	$315	$274	$274	$281	$251	$219
Total costs per bushel	$2.58	$2.32	$2.39	$2.23	$5.96	$5.85	$5.70	$5.62

[1]Soil productivity ratings of 86 to 100.
[2]Soil productivity ratings of 56 to 85.

income left after other costs have been deducted is considered the return to land. Even with fixed cash-rent leases, grain prices and nonland costs of production will affect what farm operators will be willing to pay for cash rent, which, in turn, affects farmland values.

Illinois farmland values have increased by about 30 percent since 1987 after having declined by almost 50 percent since 1979. The increase was due in part to improved farm earnings and a return to farmland that was more competitive with alternative nonfarm investments. Farm earnings for 1993 were similar for most areas of the state when compared to 1992. However, severely flooded areas along the Mississippi and Illinois rivers had much lower earnings.

The extreme northern area of the state also experienced lower earnings due to the adverse weather conditions in 1992. Overall, the financial side of the agricultural sector has been improving during the last five years compared to the early and mid-eighties. However, incomes have varied considerably due to variations in crop yields.

Farm operators should continue to monitor their financial condition closely and avoid excessive borrowing finance their business. They should also avoid purchasing machinery solely for the purpose of lowering their income-tax bill. Large capital purchases should fit into the long-term plan of operations.

Risk management will be more important to farm operators as profit margins are narrower and crop yields seem more variable due to fluctuating weather conditions. To remain competitive, farm operators will need to continue to monitor and control costs, use borrowed capital wisely, reduce risk when possible, and adopt new technologies that will economically increase the productivity of their farm business.

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Issue 94-4 *June 1994*

Production Contracts

Agriculture is in a state of rapid change. Many of the changes are being brought about through the production of nontypical specialty crops, the exploitation of niche markets, and through contract production of agricultural products. In early 1994, the University of Illinois Department of Agriculture Economics examined the future of Illinois agriculture.

The specialists suggest

. . . that farm production units will continue to increase in size, there will be more reliance on contract production, and producers will be less independent than today's farmer. Producers will face more market risk, with agriculture and agribusiness responding more to market-determined signals. Recent interest in crops with quality tailored to processing requirements may generate new market opportunities. The potential for branded products will increase. And, as new technologies are developed, opportunities to grow as of yet unheard of crops will increase. (Lins, David A. and H. Guither, eds. 1994. *Illinois Agribusiness and the Rural Economic, Strategic Issues for the Next Century*. University of Illinois Cooperative Extension Service Special Publication 85.)

These changes are increasing producer reliance on contract production of crops, livestock, horticultural, organic, and other specialty products.

Production Contracts

Production contracts are not new to Illinois. Food grain contracts have been used in east central Illinois for more than 30 years. Mason County vegetable growers have been contracting production for an equal amount of time. And many other Illinois producers of livestock and other specialty crops such as popcorn, waxy corn, edible soybeans, and chemicalfree food have been using contracts for many years.

Contracts are a legal, binding agreement. Typically, contractual arrangements are defined as written agreements between a producer and the end user of a high-value crop (or the supplier to an end-user), established prior to the production season. Anyone entering such an agreement should have a sound understanding of the agreement, its risks and ramifications. Contractors, such as snack food manufacturers or seed companies who have been contracting seed production for many years, have established reputations for honesty and fair dealing. Producers know what their contract obligations will be. Livestock production contracts have also been in existence long enough to be considered "standard," and contract pork producers have a good understanding of these terms.

Producers entering a contract for production of an agricultural crop *must* understand the terms of the agreement. If there is any question about contract terms, obtain counsel to be sure that you understand the document and that the rewards outweigh the risks. One way to do this is to imagine the worst-case scenario, and then ask yourself (and your accountant), "Can I live with this?"

Company Motivations

Understanding the reasons for a company's contracting production will help the producer understand the contracting process and be able to either protect him or herself or take advantage of the opportunity. Some of the reasons for contracting include

1. *the ability to guarantee a required supply of* raw materials in a timely manner. A corn chip company (to illustrate) will contract for a year's worth of food-grade corn. Producers will grow the corn, harvest and dry it as required, and store it until it is called for by the parent company. For this extra care and work, the producer receives a bonus, and the corn chip company knows it has a supply of raw materials.

2. *the desire to secure products of specific quality standards.* Recently, a central Illinois grain merchant has been advertising for "chemicalfree," edible soybeans to ship overseas. To obtain these, he is offering a substantial premium over market price. Conventional marketing channels do not offer "chemicalfree," edible soybeans, so the contractor has signed an agreement with producers to grow the exact product needed.

3. *the introduction (expansion) of new technologies to a producer.* Perhaps the best example of this is found with the introduction of hybrid seed corn or improved varieties of product. Today, seed companies are experimenting with herbicide-resistant genetics. In some cases, the seed company expanding and testing the biogenetically modified crops doesn't own the germplasm or the technology; they just own the right to reproduce and market the seed, so contracting with a producer allows them to expand the supply of seed.

4. *the reduction of overall firm risks with contracts rather than with vertical integration.* Contractual arrangements permit a contracting firm to replace a poor producer rather quickly with new producers. Correcting the same problem in a company facility might take a lot longer and be substantially more expensive. It's a lot less expensive for the company if the producer has to depopulate and disinfect a swine facility than if the company has to do it.

5. *control of costs.* A contract with a producer allows the company to determine input costs. Some writers suggest that fixed costs and price variability might be greater for a company-owned facility than for contractual arrangements. Other economists have said companies are more willing to accept a lower income than to have all the needed producers as employees. Recent changes in labor laws and environmental regulations also make contract production more appeal to companies.

6. *the altering or improving of producer management techniques.* This reason for contracting is very evident in the swine industry. Growers will follow company procedures, including the use of specified genetics, or they won't have a contract. In some cases, producers will not attempt to alter their management practices unless there is a contractual arrangement available to cover increased production costs.

7. *the gaining of market position.* A snack food company will contract grain in order to have secure supplies (at a relatively steady price) throughout the year. This practice reduces shutdown costs and keeps the snack food company running efficiently. Other companies may contract production to control a scarce raw material.

8. *the adoption/protection of proprietary technologies.* Again, the example of the herbicide-resistant soybean applies here. By contracting with a producer, the company does not have to give up possession of the product genetics or technology.

There are other reasons for companies to contract production. Remember, in most cases the person who writes the contract protects himself or herself first.

Producer Motivations

Some of the reasons for producers to consider contract production are quite obvious: greater returns, guaranteed market, and more profit. Some other reasons are less responsibility, fewer decisions, less trouble in obtaining production supplies, ability to obtain technically skilled supervision, ability (or access to) a larger production unit, and the ability to specialize in a specific enterprise. Still other reasons include

1. *maintaining independence with reduced risk.* It is argued that producers are willing to trade monetary income (lower returns) for a degree of independence. This allows the producer to be an independent business-person as opposed to a company employee.

2. *securing financing.* In some cases, where the risk is not excessive, the premium may offer more security to a lending institution. Their client will experience greater gross income. In other cases, capital for upgrading facilities to meet contract obligations may come from the firms themselves. A leasing arrangement may also be more conducive to the attraction of outside capital to agriculture.

3. *maintaining the ability to experiment.* A producer interested in a new crop or management practice may be more willing to experiment if contractual arrangements (such as a market for sale of the product) are available. It is anticipated that information technology will more closely link the producer and contracting firm, permitting closer monitoring of production practices.

4. *saving the farm.* A contractual arrangement may be the only alternative left to a producer. It is conceivable that custom farming arrangements would fit this scenario.

Basic Rules when Contracting

Neil Hamilton, an agricultural lawyer, lists some basic rules for contractors.

1. *Read the contract!* If you aren't sure what it is saying, take it to an attorney and have it translated. Ask the question, "What is the worst that can happen?" Be sure you can live with that result. Legal advice is an investment, not a cost.

2. *Comply with the contract terms.* If you fail to comply, you may lose more than your price premium. You might have to produce the product or pay extra damages.

3. *Know the contracting party, their finances, and their performance history.* You will be investing quite a lot of time, money, or labor, so be sure the company will be around to pay you for it. Ask, "What happens if the company goes out of business?"

4. *Weigh the advantages of the contract in terms of higher prices against any increased cost or risk.* In order to earn the premium being offered, the crop yields may be less, and production tasks may be more complex, more tedious, or more demanding. What is the risk or cost of contracting? Can you afford it? Can you tolerate it? Is the bonus worth this risk?

5. *Remember, contracts are usually subject to negotiation.* There may be enough operators standing in line for this contract that there is very little room for negotiation. However, if changes are made to the contracted agreement, make sure they are placed in writing and signed by both parties!

6. *Do not rely on verbal communications made by the company before the contract is signed or during performance.* If it's worth saying, it's worth writing.

Legal Relationships

What kind of legal relationship is being created? As new technology and new contracts come into the picture, previously known and trusted relationships could change. Some of the possibilities are

1. *a simple contract (forward contract) for sale.* This is an agreement to sell a certain amount of production at a set price and at a future time.

2. *an independent contractor.* You agree to perform certain activities for the company, for example, grow 45 acres of XYZ seed beans.

3. *a personal service contract.* In this example, the company is "buying" your efforts, not agreeing to buy your produce at the end of the growing period. This contract could affect your eligibility for ASCS programs, lending collateral, and even a landlord's lien.

4. *bailment.* Under a bailment, you have use of the seeds, but never ownership of the seeds, the growing plants, or the crop. See above.

5. *a joint venture, partnership, or outright employment.* These types of arrangements are going to affect both the company's and producer's exposure to environmental liability, worker compensation, unemployment benefits, and other forms of liability—liability for loss of the crop and so on.

Other Provisions and Some Questions

1. The contract will determine who has title to the crop at what time of the year. Some contracts will specify that title to the crop remains in the name of the company. If the crop is pledged for collateral with your lender, or if your landowner looks at the crop as security for his share of the rent, this could cause problems. ASCS is examining all production contracts to assure themselves that producers remain eligible for payments. If you are not at risk for yield and price, you may not be eligible for government payments. This is one point that needs careful attention.

2. Who stands the risk of crop loss? It is possible not to have title to the crop yet be responsible if the crop is lost due to weather. Can the crop loss risk be offset with crop insurance?

3. The contract specifies how the crop is to be grown, what practices you will use, and what standards you will meet at harvest. Are these agreeable to you? Do you have the proper equipment to meet these standards?

4. Some contracts will require that the landowner cosign the lease. Owners need to be careful that they don't give up their landowner's lien rights.

5. Consider how you will be treated under the UCC (Uniform Commercial Code). Different contractual arrangements will be handled differently. Be sure you know where you stand.

6. How is the acreage treated by ASCS? It could affect your base or your compliance standings.

7. What are the machinery requirements? Do you have to purchase any special equipment? From whom? How long do you have to pay them off? What assurance do you have for a multi-year relationship with the contracting company? Many farmers have bought special equipment to receive a contract and after one year had the contract pulled.

8. Are there a certain number of days in which you or the company can change your mind and back out of the arrangement?

The Illinois Specialty Crop Growers have published a contract checklist that offers five simple steps for understanding a contract.

1. Look first at the outlined compensation and charges.

2. Look at gross compensation across several yield levels.

3. Subtract all possible charges to see if it still looks possible.

4. Read the contract carefully. Each line has a monetary value (cost).

5. Assume the worst possible scenario for a final look, and compare with the worst possible scenario for your other crops.

Pay particular attention to seed charges, disease and insect control requirements, harvesting, nonharvested crop/minimum return/crop-adjustment funds, bonuses and premiums, mystery clauses, and grower responsibilities.

Despite years of good experiences with contracting in Illinois, the producer needs to fully understand what the document says and will do. At this point, professional legal council could be necessary. If a new concern enters the area wanting to contract with many producers, it may be feasible to pool efforts and have a group meeting with the attorney and split the cost.

The advent of high-value products, products that incorporate new, protected, technology or genetics contracting, brings new challenges for farm operators. With new challenges come new problems. By fully understanding the specific requirements of a contract, a producer is in a stronger position to make a decision that positively affects his marketing program.

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Issue 94-5 *June 1994*

The Financial Position of Illinois Farm Operators: Costs and Returns from Crop and Livestock Enterprises

This report, based on the records of farmers enrolled in the Illinois Farm Business Farm Management (FBFM) Association, reviews the financial status of Illinois farm operators. Farm operator labor and management earnings declined moderately in 1993 compared to the good earnings experienced by producers in 1992 (Figure 1). The modest drop in earnings was a result of lower corn yields and higher costs. The average corn yield for all farms in the study was 132 bushels per acre, compared to 153 bushels per acre in 1992. Although corn yields dropped 21 bushels per acre from the year before, they were equal to the last five-year average. Soybean yields of 45 bushels per acre were only 1 bushel lower than the year before.

Even though yields were lower than the year before, higher grain prices resulted in gross crop returns averaging $329 per acre in 1993, $12 per acre higher than 1992 returns. Returns to farrow-to-finish hog producers were slightly higher than the year before while returns to dairy and cattle producers were lower. For the second year in a row, farm earnings were

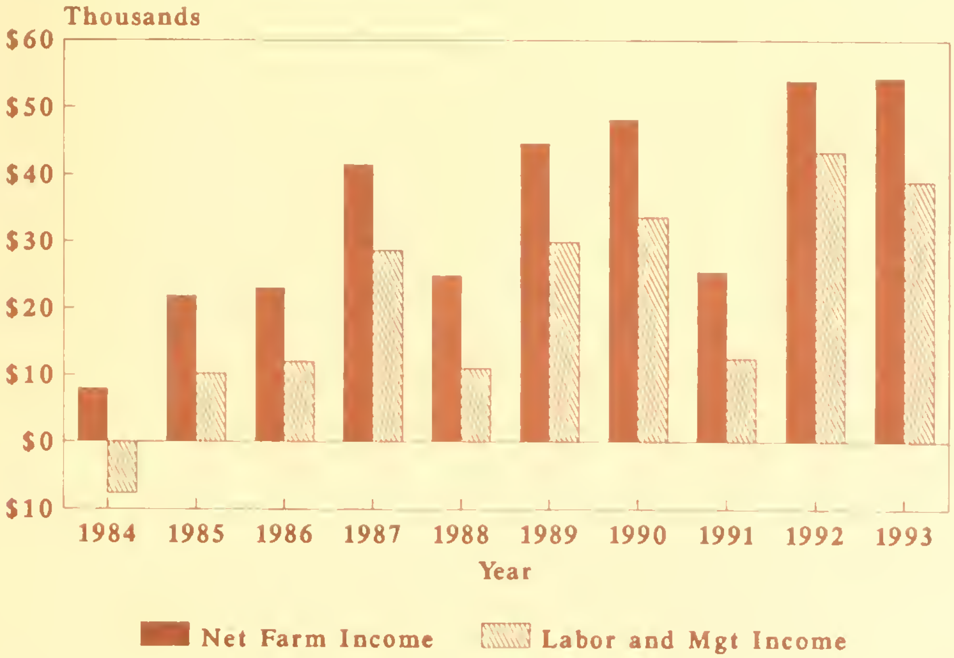

Figure 1. Operator's share of net farm income and labor and management income, 1984 to 1993.

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highest in the central and southern areas of the state and lowest in the northern region. Areas along the Mississippi River also were severely affected by the summer floods. Incomes in some of these areas declined significantly, depending on the number of crop acres that were flooded.

Records kept by the 3,635 farmers enrolled in the Illinois FBFM record-keeping program have been used to estimate changes in net worth from 1990 to 1993. On a cost basis, without considering inflation or deflation of capital asset values, the change was calculated by adding net farm and net nonfarm income and subtracting family living expenses and income and Social Security taxes (Table 1). Using this procedure, the net worth of the average Illinois farm operator increased by $19,440 in 1990, decreased by $5,881 in 1991, and increased by $21,873 in 1992 and $21,908 in 1993.

The change in net worth on a balance sheet based on fair market value would be affected positively if it included the change in land values. Land values have increased since 1988. Net worth changes would vary greatly among farms and areas in the state depending on the level of farm and nonfarm income and the amount of family living expenditures.

Net farm income is the accrued value of the operator's share of farm production less total operating expenses, including the amount of interest paid and depreciation, plus gain or loss on machinery or buildings sold. When added to net nonfarm income, this is the income available to pay for family living expenses and income and Social Security taxes. This is also the source of income used to pay the principal on intermediate and long-term debt and to invest into savings. Estimates used in Table 1 for net nonfarm income and withdrawals for living expenses and taxes were based on a sample of 467 Illinois farm families. Most of these farms were located in central Illinois. These families identified all sources of farm and nonfarm funds and the uses of these funds for precise expenditures. These expenditures were then adjusted downward by 10 percent to reflect the larger-than-average farms in central Illinois.

Table 1. Estimated Change in Net Worth and Capital Debt Repayment of Capacity for 3,635 Illinois Farm Operators

	All Illinois counties			
	1990	1991	1992	1993
Net farm income	$48,059	$25,294	$54,035	$54,439
+ Net nonfarm income[a]	12,624	12,226	12,166	13,122
− Family living expenses[b]	32,743	33,208	35,173	36,199
− Income and Social Security taxes[b]	8,500	10,193	9,155	9,454
Change in net worth	$19,440	($ 5,881)	$21,873	$21,908
+ Depreciation	15,984	15,173	16,157	21,937
Funds available for capital debt repayment	$35,424	$ 9,292	$38,030	$43,845
Capital purchases	$24,406	$21,757	$18,828	$26,856
Cash interest paid	$15,507	$15,617	$15,194	$14,422

[a]Actual amounts identified from a sample of 467 farms for 1990, 1991, 1992, and 1993.
[b]Actual amounts identified from a sample of 467 farms for 1990, 1991, 1992, and 1993 reduced by 10 percent.

Capital Debt Repayment Capacity

The average amount available to each farm operator for repayment of capital debt was estimated at $35,424 in 1990, $9,292 in 1991, $38,030 in 1992, and $43,845 in 1993 (Table 1). These were the funds estimated to be available for capital purchases and payment of principal on intermediate and long-term debt. The table shows actual dollar commitments per farm that were made for capital purchases of machinery, equipment, or buildings. Results from the last four years indicate that, except for 1991, the amount spent for capital purchases has been less than the funds available for capital debt repayment. Total capital purchases in 1993 were 43 percent higher than in 1992. Expenditures per tillable acre averaged $37, the highest since 1982 and 1990 when they were also $37 per tillable acre. Limited capital replacement during the mid-1980s combined with better farm earnings in 1989 and 1990 resulted in farmers starting to increase their capital purchases in 1990 and 1991. However, lower farm incomes in 1991 resulted in a reduction of purchases in 1992. Improved earnings in 1992 and 1993 resulted in increased purchases in 1993.

The records show that funds available for debt repayment varied between geographic areas in the state. Estimated changes in net worth in 1993 were positive for most areas of the state. Estimated changes in net worth ranged from a drop of $15,000 in the northwest corner of the state to a $25,000 to $35,000 increase in central and southern Illinois.

Interest Paid as a Percentage of Gross Farm Returns

The amount of interest paid by an FBFM operator averaged 7.9 percent of gross farm returns in 1992, compared to 9.9 percent in 1991, 8.8 percent in 1990, and 8.9 percent in 1989. Preliminary analysis of the 1993 data indicates that this figure will be lower than the 1992 figure. The average cash interest paid in 1993 was $14,422, $772 lower than in 1992. This was the second year in a row that the amount of interest paid decreased compared to the previous year. Approximately 1 percent of the farm operators had negative incomes in 1992 (Figure 2). These operators were paying over 35 percent of their gross farm returns for interest. Sixty-nine percent of farm operators in 1992 paid less than 10 percent of their gross farm returns for interest. The average income for these 69 percent was $6,661 higher than the average income for all the farm operators. The percent of farm operators paying less than 10 percent of their gross farm returns for interest was the highest since the late 1970s.

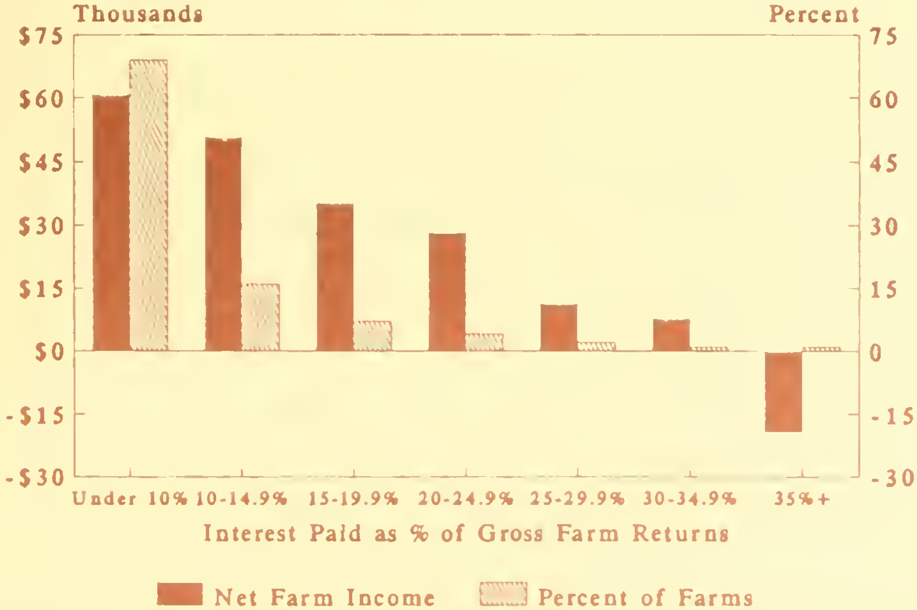

Figure 2. Operator's average net farm income and percent of farms by interest paid as a percent of gross farm returns, 1992.

Costs and Returns from Crops

Corn and soybeans are crops that make important contributions to net farm incomes and the financial status of Illinois farm operators. Figures 3 and 4 show the cost and return per bushel of both corn and soybeans produced each year from 1984 to 1993 on 588 central Illinois grain farms with high-quality soils and no livestock. Note that the total cost of growing a bushel of corn has exceeded the average annual Illinois corn price in four of the ten years since 1984. The difference between the total of all costs and the total nonland cost line is the

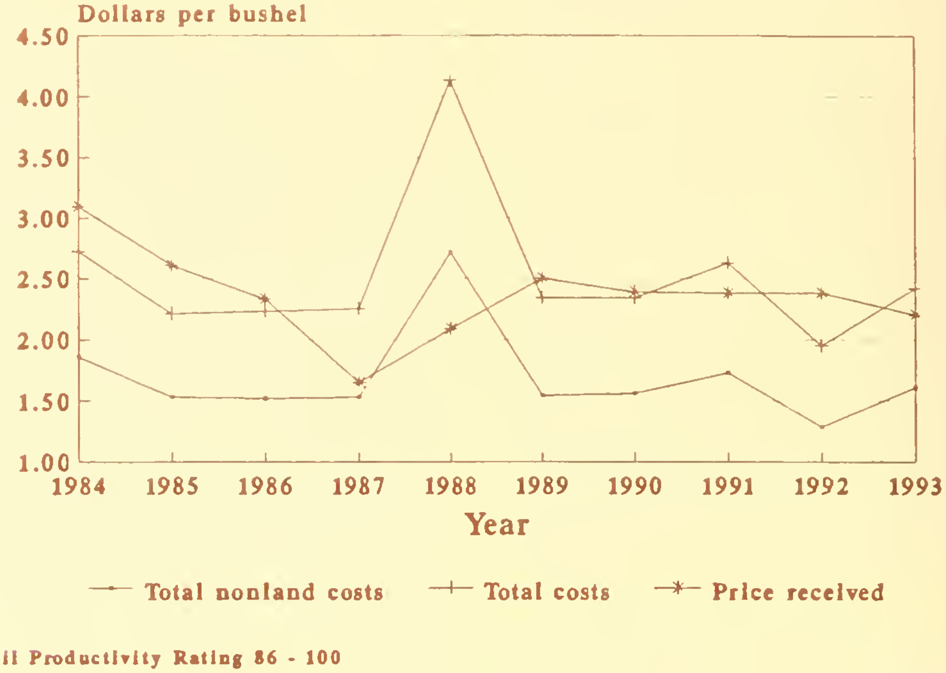

Figure 3. Cost and return per bushel of corn on central Illinois grain farms, 1984 to 1993.

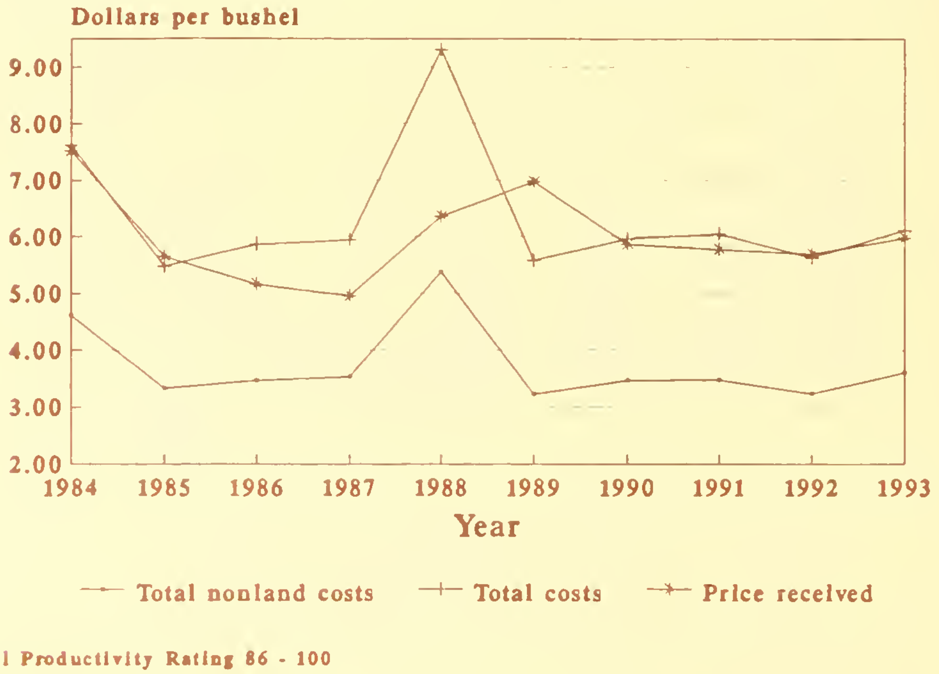

Figure 4. Cost and return per bushel of soybeans on central Illinois grain farms, 1984 to 1993.

charge for the use of land. The deficits indicate that total returns for the year were below total economic costs, which include a fair return to capital and unpaid operator labor. Income support provided by the government farm program offset part of the deficits.

Variable cost, part of the nonland costs, reflects the total of cash expenditures for fertilizer, pesticides, seed, and drying, which are normally shared according to the terms of the lease on rented farms, plus the cost of fuel and machinery hire and repair. Other nonland costs include labor, depreciation, interest, building upkeep, and overhead.

Total costs per acre of corn produced in 1993 increased 6 percent compared to 1992. Increased costs combined with lower yields resulted in the cost per bushel of production in 1993 increasing to $2.42 per bushel compared to $1.95 in 1992. Using the past four-year average corn yield of 152 bushels per acre, costs per bushel of corn produced are now averaging about $0.95 for the variable cost, $1.60 for the total nonland cost, and $2.41 for the total cost.

Figure 4 shows the cost and return per bushel of soybeans produced on these same farms from 1984 to 1993. The total cost has exceeded returns each year since 1984 with the exception of 1985, 1989, and 1992. Total costs per acre increased by 9 percent in 1993. Higher costs caused the cost per bushel to increase by 49 cents in 1993. Using the past four-year average yield of 48 bushels per acre, costs per bushel are now averaging about $1.85 for the variable cost, $3.69 for the total nonland cost, and $6.25 for the total cost.

Costs and Returns from Livestock

Livestock have also been important to the current financial status of farm operators. The cost and return per hundredweight of pork produced annually from 1984 to 1993 on an average sample of 98 farrow-to-finish enterprises with an average of 452 litters per year are shown in Figure 5. Returns to farrow-to-finish hog producers were slightly higher in 1993 compared to 1992. However, returns in 1993 were slightly lower than the last five-year average. Prices received for market hogs were 9 percent higher in 1993 than in 1992. Feed costs were slightly higher than the year before.

Average returns above the cost of feed and purchased animals from the annual records of about 1,400 individual livestock enterprises from 1989 to 1993 are shown in Table 2. This is the return available to pay for labor, machin-

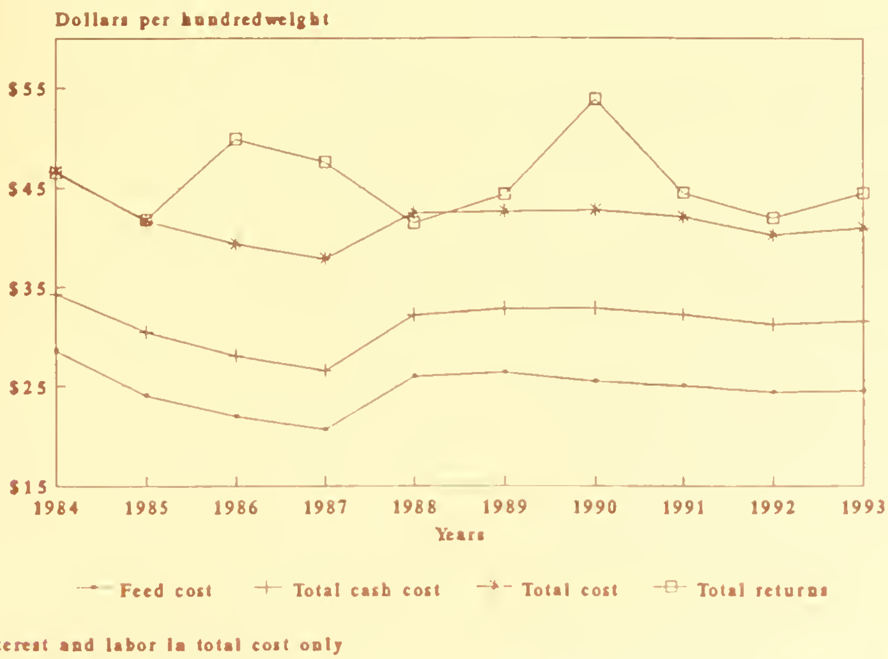

Figure 5. Cost and return per hundred pounds of pork on farms with over 250 litters, 1984 to 1993.

Table 2. Returns above Cost of Feed and Purchased Animals to Livestock Enterprise Units from 1989 to 1993

Year	Farrow-to-finish hogs	Feeder-pig finishing	Feeder cattle	Dairy cattle	Beef herd calves sold[a]
	-------per hundredweight-------			*-----per cow-----*	
1989	16.71	10.20	18.66	1,334	144
1990	27.15	15.79	25.74	1,471	203
1991	17.67	6.80	3.97	1,064	88
1992	16.45	9.39	25.40	1,398	125
1993	18.76	7.89	17.10	1,178	92
5-year average	**$19.35**	**$10.01**	**$18.17**	**$1,289**	**$130**
Nonfeed costs, 1989-1993					
Direct cash	$ 6.65[c]	$ 4.20[b]	$12.68[c]	$ 440[c]	$ 30[b]
Other costs	9.76[c]	6.60[b]	10.73[c]	618[c]	175[b]
Total	**$16.41**	**$10.80**	**$23.41**	**$1,058**	**$205**

[a]The feed cost for beef herds includes up to $60 of hay equivalent from salvage roughage.
[b]Includes veterinary costs, utilities, fuel, equipment and building repair costs, depreciation, labor, and other nonfeed costs, including interest on feeder livestock from *Crop and Livestock Budgets, Examples for Illinois, 1993–1994* (AE-4700, April 1993).
[c]Estimates of annual nonfeed costs are based on enterprise cost studies of operative units from 1989 to 1992.

ery, equipment and building repairs, depreciation, livestock expense, taxes, overhead, and an interest charge on all capital used. There is no economic profit until these costs are covered. The last five-year average returns from the farrow-to-finish hog and dairy enterprise covered total costs. The feeder-pig finishing enterprise operated slightly below a break-even level. Based on the estimates of nonfeed costs in Table 2, the average returns above all costs from 1989 to 1993 for farrow-to-finish hogs were $19.35 (returns above feed and purchased animals) minus $16.41 (nonfeed costs), or a positive $2.94 per hundred pounds produced. For feeder-pig finishing enterprises, total costs per hundredweight exceeded returns by an average of $0.79. Feeder cattle showed returns per hundredweight that were $5.24 short of covering all costs; dairy returns averaged $231 per cow above all costs, whereas beef cow herds were $75 per cow short.

Returns to dairy and cattle producers in 1993 were below the 1992 returns, while returns to hog producers were slightly higher. Prices received for market hogs were 9 percent higher in 1993 compared to 1992, while slaughter cattle prices were 3 percent higher and milk prices were 4 percent lower. Feed costs, the largest single expense item in raising livestock, were slightly higher for most livestock enterprises. Farrow-to-finish hogs and dairy enterprises realized a positive return to management, which meant returns were more than total economic costs. Returns to most livestock enterprises decreased last year as the level of meat production continued to increase, putting pressure on livestock prices. Livestock producers continue to increase the size of their enterprises and operate at efficient levels. Pigs weaned per litter averaged 8.14 pigs per litter, while feed conversion was at its lowest point ever, averaging 367 pounds of feed per 100 pounds of pork produced. Milk production per cow dropped below 17,000 pounds of milk to 16,970 pounds. Poor-quality forage was a contributing factor to this reduction. Future returns will depend to a great extent on when and to what degree producers respond to various profit margins by increasing or reducing production and by continuing to improve production efficiencies.

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Farm and Family Living Income and Expenditures, 1990–1993

In 1993, the total, noncapital living expenses of 467 farm families enrolled in the Illinois Farm Business Farm Management Association (FBFM) averaged $35,225, or $2,935 a month for each family (Table 1). This average was 2.6 percent higher than in 1992 and 8.5 percent higher than in 1991. Another $4,996 was used to buy capital items such as the personal share of the family automobile, furniture, and household equipment. Thus, the grand total for living expenses averaged $40,221 for 1993 compared with $39,081 for 1992, or a $1,140 increase per family. The average amount spent per family for capital items was $251 more, while noncapital expenses increased $889 per family. The sample farms, which were mainly grain farms, were located primarily in central Illinois in a 15-county area bounded by Jacksonville, Peoria, Champaign, and Mattoon.

Figure 1 illustrates the annual capital and noncapital family living expenditures and income and Social Security tax payments for 1984 through 1993. Total family living expenses increased 5.05 percent annually during this period. Income and Social Security tax payments have increased during the late 1980s and early 1990s due to improved farm earnings, elimination of investment tax credit and an increase in the Social Security tax rate. The amount of income taxes paid in 1993 was at its second highest level ever. Medical expenses averaged over $5,000 for the second year in a row. Since 1990, medical expenses have increased $976 or 22 percent.

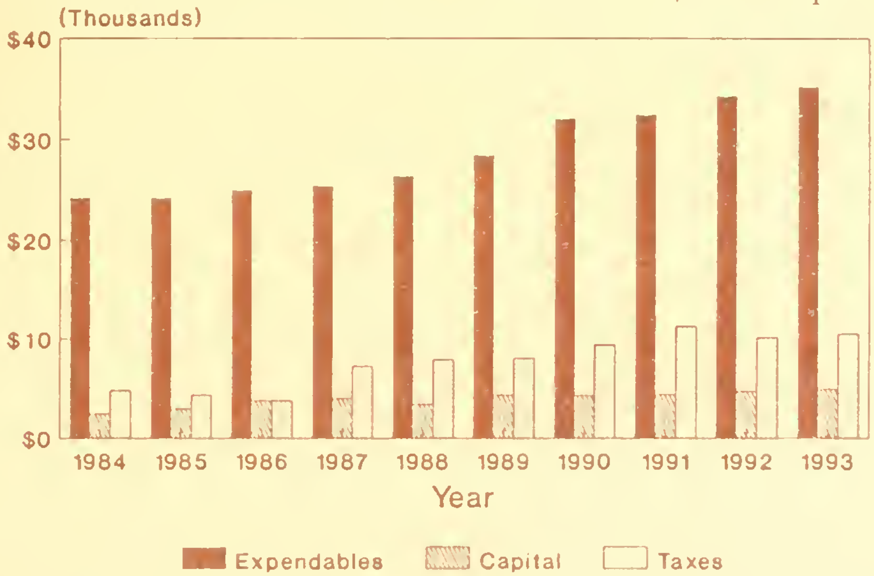

Figure 1. Noncapital and capital family living expenditures and income tax and Social Security payments, 1984 to 1993.

Table 1. Average Sources and Uses of Funds Over a Four-Year Period and by Noncapital Living Expenses for Selected Illinois Farms

	All records, average per farm				Family of 3 to 5, 1993[a]	
	1993	1992	1991	1990	High third	Low third
Number of farms in sample	467	452	456	408	95	95
Tillable acres farmed	746	755	731	719	946	631
Acres owned	125	132	131	120	150	96
Farm assets, January 1[b]	$432,768	$426,539	$381,588	$358,394	$532,186	$332,511
Farm assets, December 31[b]	450,325	450,722	383,283	384,363	546,960	354,997
Liabilities, January 1	220,410	218,402	198,764	183,161	300,027	178,983
Liabilities, December 31	223,353	229,076	202,708	203,168	298,039	190,263
Net farm income	55,731	55,759	30,596	50,825	68,608	48,950
Sources of dollars						
Net nonfarm income	$ 13,122	$ 12,166	$ 12,226	$ 12,624	$ 11,533	$ 11,868
Money borrowed	135,712	144,676	118,446	116,122	192,299	105,162
Farm receipts	220,045	193,259	177,832	180,737	283,806	197,887
Uses of dollars						
Interest paid	$ 14,121	$ 16,006	$ 15,550	$ 15,070	$ 19,708	$ 11,691
Cash operating expenses	139,570	125,392	111,037	112,943	178,062	129,074
Capital farm purchases	26,946	19,867	22,829	27,834	30,158	29,996
Payments on principal	135,090	134,566	113,510	98,101	197,127	95,941
Income and Social Security taxes	10,504	10,172	11,326	9,444	12,450	7,549
Net new savings and investment	2,427	5,017	-2,646	9,710	-6,845	10,738
Living expenses						
Contributions	$ 1,290	$ 1,285	$ 1,271	$ 1,260	$ 1,676	$ 709
Medical	5,357	5,022	4,675	4,381	6,089	3,670
Insurance, life and disability	2,413	2,431	2,268	2,227	3,307	1,431
Expendables	26,165	25,598	24,266	24,222	39,632	19,218
Total noncapital expense	(35,225)	(34,336)	(32,480)	(32,090)	(50,704)	(25,028)
Capital	4,996	4,745	4,418	4,291	6,274	4,900
Total living expenses	$ 40,221	$ 39,081	$ 36,898	$ 36,381	$ 56,978	$ 29,928
Percentage change, total noncapital living expenses	2.6	5.7	1.2	12.6		

[a]Records were sorted into high- and low-third categories according to total noncapital living expenses.
[b]Modified cost basis, except bare land values were held at current values between January 1 and December 31.

How these families use their funds depends somewhat on the levels of net income from farm and nonfarm sources and the priority of the expenditure. In this sample, the 1993 net farm income decreased slightly ($28 per farm). Net nonfarm income, which averaged $13,000 for the first time, increased by $956 in 1993.

The amount of interest expense paid by each farm operator decreased from $16,006 in 1992 to $14,121 in 1993. Interest paid as a percentage of farm receipts decreased from 8.3 percent in 1992 to 6.4 percent in 1993. A combination of lower interest expense and higher gross returns caused the decrease in this percentage. This has been the lowest this percentage has been since 1977 when it was 5.9 percent. The highest that this percentage has been during the last ten years was in 1984 and 1985 when it was 14.1 percent. As a percentage of cash operating expenses, the interest paid decreased from 11.3 percent in 1992 to 9.2 percent in 1993. Cash farm receipts were $295 per tillable acre, an increase of $39 per tillable acre and the highest ever. Cash operating expenses, including interest, increased $19 per tillable acre. Machinery and building purchases increased from $19,867 in 1992 to $26,946 in 1993.

Debt-to-Asset Ratio Decreases

The sample of farms showed an average debt of 50 cents for each $1 of farm assets as of December 31, 1993; machinery was valued at cost less depreciation. The debt for each $1 of assets was 51 cents on December 31, 1992. The amount of debt decreased compared to a year earlier while the value of farm assets stayed about the same. This debt-to-asset ratio would be lower if machinery were valued at a current market value. Including nonfarm assets would also lower the ratio.

The farms in this sample were 21 acres larger than the average for the 7,200 farms in the FBFM record-keeping program. Crop yields averaged about 5 percent above those reported by the Illinois Crop Reporting Service. Operator's farm income from this sample of farms was slightly higher than the average of all Illinois record-keeping farms. The average operator's net farm income of all Illinois record-keeping farms was $54,439 or $1,292 less than the average net farm income for this sample. The average figure for living expenditures for farms in this sample is estimated to be 15 to 20 percent above the average of all Illinois farm operators having more than $40,000 gross sales per farm. This is due to the fact that the average net farm income for this sample is usually higher than the average for all farms.

In 1993, the operators of these 467 farms averaged 46 years of age. The family averaged 3.7 members with the oldest dependent child 10 years old. The family farmed 746 tillable acres; of this amount, they owned 125 acres, or 17 percent, of this land. The operators kept records so that all sources of funds, both farm and nonfarm, balanced with all uses of funds in a complete monthly cash-flow accounting system.

In the table, the averages per farm for total family living expenses are divided into five categories for 1990 through 1993. The "expendables" category includes cash spent for food, operating expenses, clothing, personal items, recreation, entertainment, education, and transportation. This category also includes selected itemized deductions such as the personal share of real estate taxes. Cash spent for capital improvements exceeding $250 is not included. The use of a rented house on an estimated 40 to 50 percent of the farms in this sample is not included because these data cover only cash outlays.

Noncapital living expenditures per tillable acre increased $2 to $47 per tillable acre. During the last decade, noncapital living expenditures have varied from $38 to $47 per tillable acre. The excess on nonfarm taxable income over nonfarm business expense was $13,122 in 1993, or 33 percent of the total living expense; in 1992, the excess was 31 percent. It includes dividends on stocks, interest on savings and money-market funds, income from other nonfarm investments, and income from off-farm employment performed by family members. Interest earned and left in savings accounts not included in the cash flow is not reflected in the nonfarm income.

Assets, Liabilities Decrease Modestly

The value of farm assets and the amount of liabilities for this sample of 467 farms decreased when compared to a year earlier. The value of farm assets on December 31, 1993, was only $379 less than a year earlier. The small change reflects the fact that land prices did not change and the other farm assets changed very little. At the same time, liabilities also decreased by $5,723. These farms borrowed only $622 more than they made in principal payments for the year. In 1992, the amount borrowed exceeded principal payments by $10,110. The $26,946, or $36 per tillable acre, spent on capital purchases for machinery and equipment was $5 and $10 per tillable acre more than what was spent in 1991 and 1992 respectively.

Although less than in earlier years in the 1980s, interest payments continue to be one of the highest farm expense items. The amount of interest paid in 1993 decreased compared to 1992. Interest includes that paid on operating, intermediate, and real estate debt. Interest paid increased from 12 percent of total farm operating expense in 1979 to 21 percent in 1983 and dropped to 9 percent in 1993. The $14,121 interest payment in 1993 was 6.4 percent of total cash farm receipts, down from 8.3 percent in 1992.

High-Third/Low-Third Comparison

The records from farm families with three to five persons were sorted into two categories, the high-third and the low-third, according to their noncapital living expenses. The total living expenses for the high-third group averaged $56,978, compared with $29,928 for the low-third group. Figure 2 illustrates total living expenses for these two groups for 1985 through 1993. The high-third group farmed 315 more acres than the other group and owned 16 percent of the land farmed; the low-third group owned 15 percent of the land farmed. The larger farms in the first group had more income for living expenses and to pay income tax. Net farm plus nonfarm income was $80,141 for the high-third group compared with $60,818 for the low-third group. The average age of operators in the high-third group was 43, and the number of family members was 4.3. This compared with 40 years of age and 3.9 family members for the other group. Subtracting total living expenses and income and Social Security taxes paid from the total of net farm and nonfarm income results in a positive balance of $10,713 for the high-third group and $23,341 for the low-third group. Figure 3 illustrates this balance for these two groups for 1985 through 1993. It is interesting to note that although the low-third group had less income than the high-third group, they had more funds remaining after family living expenditures and taxes.

Farm operations continue to grow in size. As these operations expand, more funds are flowing in and out of the businesses. More lenders are requiring cash-flow projections and continual monitoring of these projections. It is, therefore, important that more farmers learn how to balance and monitor their cash flow each month. Computer program assistance is now becoming available in more service centers such as most FBFM Association district offices. These centers are prepared to offer services to help farmers project monthly cash flow on computer printouts so that they can compare projections with their actual results. Increased use of microcomputers for farm accounting purposes should also assist more farm operators in accounting for all funds.

For farm operators with low equity or very high debt-to-asset ratios, this type of accounting is essential. These operators must account for all of their sources and uses of funds in order to make sound financial management decisions.

The data summarized in this process may also serve as a guide in budgeting allowances for family living expenses. For families in this sample, the family living expenses averaged $54 for each tillable acre farmed. If the net nonfarm income of $18 per tillable acre is used for living expenses, $36 per tillable acre would have to be generated from the farm business to meet family living requirements. Since 1983, this amount has varied only $7 per tillable acre, ranging from $29 to $36. Each family must determine how much each acre of crop or each litter of hogs should contribute to their family living expenses. This amount, when added to production costs and other obligations, can help to determine break-even prices needed for products sold.

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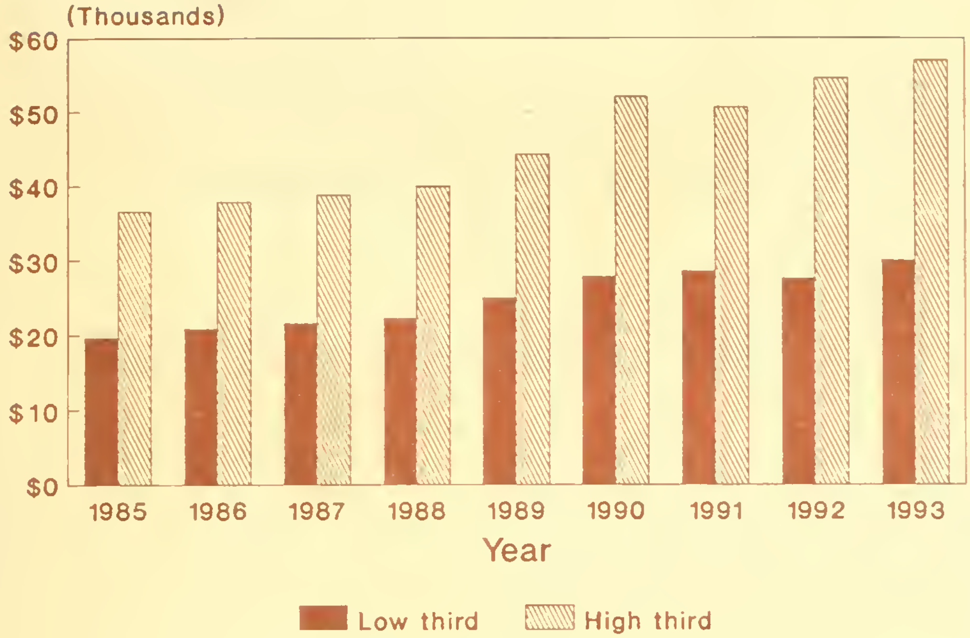

Figure 2. Total family living expenditures for families with three to five persons, sorted into high-third and low-third categories according to noncapital living expenses, 1985 through 1993.

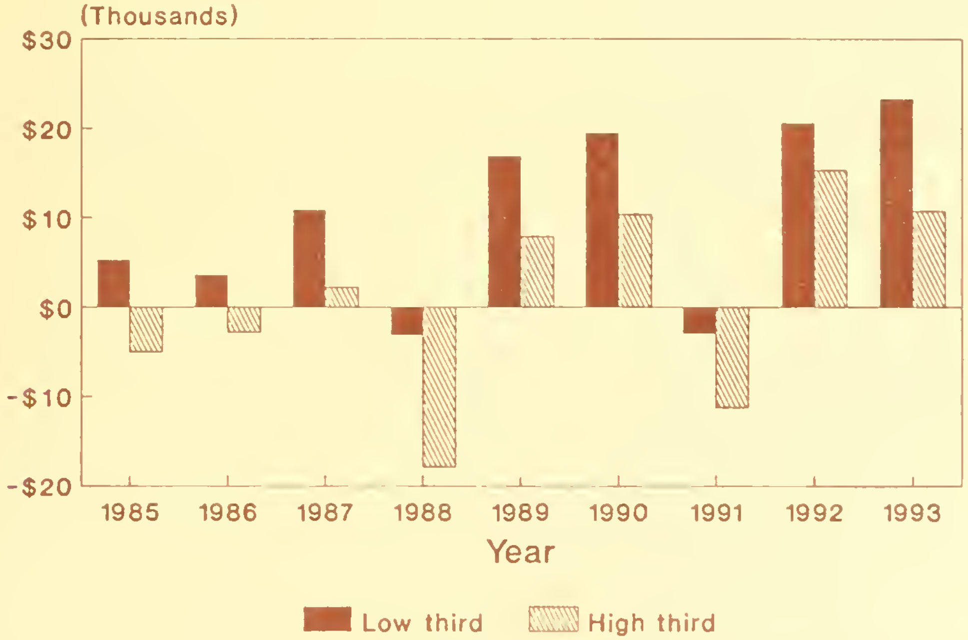

Figure 3. Average of net farm and nonfarm income less total family living expenses and income and Social Security taxes paid, sorted into high-third and low-third categories according to noncapital living expenses, 1985 through 1993.

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Issue 94-7 *July 1994*

Price of Alfalfa Hay in Illinois in 1994

Hay prices in Illinois in 1994 will probably be similar to 1993 prices. There were some stand losses or injury to alfalfa throughout the Midwest during the 1993-94 winter. First harvest yields in 1994 have been about 110 percent of 1993 yields. Weather has been favorable for harvesting the first harvest throughout Illinois.

Table 1 suggests some pricing strategies that may be useful for the producer or buyer. Some hay will be purchased from the field, some from the barn, and some delivered. Many of these considerations will need to be incorporated into final prices.

The table assumes hay that is valued at $90 per ton in the barn. This value is the approximate average value of good-quality hay

Table 1. Hay Prices for 1994

		Yield, ton/acre		
Item	$/unit	1.00	2.00	3.00
		- - - - - - - - - - - - -$- - - - - - - - - - - - - -		
Hay price, standing in the field	$/T	47.26	52.76	54.60
Hay price, standing in the field	$/A	47.26	105.53	163.79
Mowing/conditioning	$7-9/A	7.00	8.00	9.00
Raking	$6-8/A	6.00	7.00	8.00
Baling, $0.34 per 50-lb bale	$/A	13.60	27.20	40.80
Harvesting cost	$/A	26.60	42.20	57.80
Harvesting cost	$/T	26.60	21.10	19.27
Hay price, baled hay taken from the field	$/T	73.86	73.86	73.86
Hay price, baled hay taken from the field	$/A	73.86	147.73	221.59
Hauling and storage	$/A	10.00	20.00	30.00
Harvesting + hauling and storage	$/T	36.60	31.10	29.27
Harvesting + hauling and storage	$/A	36.60	62.20	87.80
Field cured, 18% moisture	$83.86/T	83.86	83.86	83.86
Barn price, barn dry	$90/T	90.00	90.00	90.00

as of May 1, 1994. Other values may be assigned, varying with quality and demand.

The price of hay from the field may be adjusted for yield. Price adjustments may be made at shaded data entry points.

Summary. A person can afford to pay $47.26 per ton for standing alfalfa at a 1 ton/acre yield, $52.76 per ton at a 2 ton/acre yield, and $54.59 per ton at a 3 ton/acre yield when barn-stored hay, at 12 percent moisture content, is valued at $90 per ton, and field-cured hay is at 18 percent moisture content.

Barn-dry hay @ 88% dry matter (DM) @ $90 = $102.27/T DM
Field-cured hay @ 82% DM @ $102.27/T DM = $83.86/T field weight

Custom rates have been taken from *Farm Economics Facts & Opinions* 93-16, University of Illinois, October 1993.

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FARM ECONOMICS
Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 94-8 *August 1994*

Land Value Trends: How Far Up This Time?

After experiencing the largest increase in land prices in this century in the 1970s, we have now had the largest decline in this century in the mid-1980s--with land prices reaching their low in the fall of 1986. A slow increase in land prices began in 1987, and this trend has continued through 1994, essentially for a period of seven years.

Unlike the situation in the 1970s, which started out with large price increases shortly after the Russian off-take of grain and land prices more or less on a plateau in the last two or three years of the decade, the recent increasing trend has gained momentum. In the first part of this seven-year period, increases were generally around 2 or 3 percent per year on the average in Illinois. In the last three years, the uptrend has increased to 5 to 7 percent per year, with the USDA index showing an increase of 7 percent for the state as a whole from spring of 1993 to spring of 1994. The Federal Reserve Bank of Chicago shows an increase of 9 percent in east-central Illinois from April 1, 1993 to April 1, 1994 with a 3 percent increase in just the first quarter of 1994.

The land market is quite strong over most parts of the state except in the northwest, which has had some poor weather and disappointing crops. Even in that part of the state, prices increased significantly last year according to the Federal Reserve Survey. In a few areas of the state, land sales are considered a hot market by most observers. In the Jacksonville, Springfield, and Taylorville areas, a number of bare land tracts that have little or no potential for nonagricultural development have reportedly sold for over $3,000 per acre. In these areas, prices have increased by 10 to 15 percent since last summer. At this time, it would be difficult to buy a high-quality farm (basic soil rating 85 to 100) at less than $2,500 per acre. Our information suggests that the supply of good land on the market currently is less than it was in the 1970s, and it is held by owners who are in better financial condition. Furthermore, a higher proportion of the land sold in the last seven years has been sold to buyers who were able to pay cash and did so. Only now, approaching what may be the plateau in this cycle, are land buyers beginning to leverage their land purchases. Many current buyers still have relatively low debt-to-asset ratios. Institutional buyers have been a strong factor in the current market.

Clearly, prices have not reached the high level of 15 years ago when most better-quality farms were selling from $3,600 to $4,000 per acre. But that does not mean they should reach that level under current circumstances. This is especially true if we deflated prices by the change in the value of the dollar. The reasons for the last two cycles in land prices have been quite different.

In the first cycle, it was mainly macro world events that initiated the run-up in land prices. The United States went off the gold standard for international settlement at $35 an ounce in the spring of 1972. Gold increased to about $150 an ounce, a devaluation of the dollar by over four times. And because oil was priced in dollars in the world market, the OPEC countries increased the price of oil from about $12 to about $40 a barrel. At that time, Russia was the second largest producer and exporter of both gold and oil. Russia decided to buy grain with their sudden windfall in income, and the race to buy land was on. This rise in land prices was not limited to the United States. A similar rise happened in every grain-exporting country. The Federal Reserve Board under Paul Voelker decided to stop inflation with the use of high interest rates. These rates peaked in February 1982, and land prices slid down an icy slope until they reached their bottom in the fall of 1986. Many leveraged land buyers were unable to hang on to the sled on that downward slide.

There have been three main driving forces on the second cycle lifting land prices. These forces are low rates of return on alternative investments, application of the new minimum tillage technologies, and continuing upward yield trends.

A discrepancy between returns on land and returns to other assets favoring land began showing up in the fall of 1986, and this discrepancy widened through at least 1993. The positive relationship between land returns and other asset returns still exists. For example, the rate of return on a current basis for stocks included in the Dow-Jones index average is only about 2.5 percent. Bank savings accounts are returning about 2 percent, government treasury bills got down to about 3 percent, and ten-year treasuries have been running about 7 percent. Even at the current higher land prices, the current rate of return on good farmland is running 3 to 4 percent. In the last few years, the rate has been as high as 5 to 7 percent, not counting increases in value. So from a purely financial comparative aspect, farmland is still a very competitive investment. If interest rates rise appreciably, the returns advantage that land now has may well be wiped out. (The three-month bill rate now stands at 4.20 percent, and the 30-year bond is at 7.60 percent.) As the value of the dollar has declined, due mainly to the continuing trade deficit with the rest of the world and particularly with Japan, interest rates may rise to reduce the flight of the dollar into other currencies. Mortgage rates would be higher, and there would be less and less advantage to leveraging equity investments in farmland. So this factor (lower alternative investment returns), which has been one of the main factors causing land price increases over the last seven years, may not be much of a factor in the near future.

The new minimum tillage technologies are being applied more rapidly in Illinois than in any other state. I am convinced that this is because farmers have learned faster here of the economic advantages of no-till, and not because Illinois farmers are any more conscientious about saving soil than farmers in other places. In fact, soil conservation needs are greater in other states than in Illinois. Machinery cost, fuel cost, and labor cost are all reduced by no-till. There may be a small offsetting cost increase for herbicides, but the jury is still out on this one. This significant cost reduction on the production cost side of the profit equation has led to greater competition among farmers for land in the purchase market as well as the lease market. More land is now rented on a cash-rent basis, and as the cash rent is bid up by farmers, this produces a higher return for the land with investors bidding up the price of land. The amount of land rented on cash has increased significantly; however, according to our recent leasing survey, not more than 40 percent of the land rented is on a cash-rent lease. This means that the rent increases, both for cash leases and for crop-share leases (where terms are also being changed), have not run their course. This factor will continue to have a driving effect on land prices.

The third factor is the continuing increase in yields of both corn and soybeans. Agronomists believe there is still a significant potential for yield increase. Few genetic breakthroughs are on the horizon, but there is every reason to believe that marginal increases in yield will continue. Some of the increases in yield are likely to come from farmers learning how to handle their farms better, through adoption of minimum tillage, and from the newer global positioning applications, which provide a more precise way to evaluate crop management. At present, there is some question as to how profitable this new technology is, but as time goes on and the full use of its potential is applied, it is likely to increase profits. As with most new and profitable technologies, some of the profit will be captured for land investment. We expect future demand to keep pace with increases in yields, giving us relatively stable prices, which may have a wide variance because of yield variances about the trend line. Nevertheless, yield increase will be important to continuing land price increases.

Index Numbers of Illinois Farmland Values

Date	Index numbers (1967=100)[1]	Date	Index numbers (1967=100)	Date	Index numbers (1977=100)
1912	25	1951	50	1977	100
1913	26	1952	54	1978	111
1914	27	1953	55	1979	125
1915	27	1954	56	1980	135
		1955	57		
1916	27			1981	143
1917	29	1956	60	1982	131
1918	31	1957	65	1983	117
1919	34	1958	66	1984	115
1920	42	1959	71	1985	84
		1960	71		
1921	40			1986	73
1922	33	1961	69	1987	67
1923	32	1962	71	1988	72
1924	30	1963	75	1989	79
1925	30	1964	78	1990	81
		1965	84		
1926	29			1991	83
1927	26	1966	94	1992	87
1928	25	1967	100	1993	87
1929	25	1968	104	1994	93
1930	24	1969	109		
		1970	107		
1931	21				
1932	17	1971	108		
1933	14	1972	116		
1934	15	1973	129		
1935	16	1974	173		
		1975	209		
1936	17				
1937	18	1976	260		
1938	19	1977	353		
1939	19	1978	390		
1940	20	1979	441		
		1980	476		
1941	20				
1942	23				
1943	24				
1944	27				
1945	29				
1946	32				
1947	37				
1948	39				
1949	41				
1950	42				

[1]Index numbers are calculated from data taken from January 1 to April 1 of each year from USDA sources. Index numbers from 1912 to 1976 are based on 100 in the year 1967, and index numbers from 1977 on are based on 100 in the year 1977. This data is provided by Dr. John T. Scott, Jr., professor of land economics and farm management, University of Illinois at Urbana-Champaign.

Recent declines in corn and soybean prices may put a damper on new record land prices in the near term. However, I expect land prices to increase somewhat further over the next two or three years although at a much slower rate, leveling off at prices lower than the last land boom in the late 1970s. What happens after that depends much on macroeconomic policies and world events.

Volatility of the land market is likely to increase. A recent study shows that yields vary more as average yields have increased. A statistician would expect this outcome, but what is unexpected is that the relative variance has increased. In other words, the percentage of yield variation compared to the average yield has increased. This suggests that, in the future, land prices may also be more volatile even as they continue to rise. Another factor affecting land price volatility is increasing land acquisition by institutional investors. As more and more land is acquired by institutional investors, less and less land will be available on the land market for individuals to purchase. When an institution acquires land, it is likely to continue in institutional ownership much longer than when it is owned by an individual; all persons either sell or die and the land then changes hands. Thus, when the supply available is reduced as a proportion of the whole through greater and continuing institutional ownership, the supply becomes more inelastic and a small change in demand will have a large effect on the price. This is true both when the market price is rising and when the market price is falling. I view this change in the market for land to be detrimental to farmers or other individuals who may want to invest in farmland. Eventually, it will result in more monopolistic control of the land resource.

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Issue 94-9 *September 1994*

How Illinois Farmers View Agricultural and Food Policy Issues

During January and February 1994, 1,000 randomly selected Illinois farmers received a questionnaire that asked their preferences on policy issues to be discussed as Congress writes the 1995 farm bill. Specially trained interviewers phoned farmers who did not respond by mail. The report is based on responses from 540 farmers who answered by mail and by phone. On some issues, a majority of Illinois farmers agree, but on others they are divided. A more complete understanding of Illinois farmers' views on the major issues should be a useful starting point to build coalitions and bridges with other groups to achieve similar policy goals.

Farm commodity programs

Traditionally, commodity programs have been a major part of agricultural and food legislation. In 1995, these programs will be an important part of the final legislation, but many other issues will be covered.

Preferred price support policy. Although 35 percent of respondents would prefer to keep the present programs, 44 percent would like to gradually eliminate all commodity programs including set-aside, price support deficiency payments, and government storage payments. Very few respondents favor mandatory supply control or the decoupling of production requirements from program payments.

Farmers over 50 years of age show the most support for present programs. Farmers under 35 years of age show the most support for eliminating all commodity programs. Those farmers who had attended college showed the least support for current programs, and more than half of all college graduates called for phasing out commodity programs.

Target prices. Farmers were divided on their preferences for a policy on target prices. While 42 percent would like to see higher target prices each year to match the rate of inflation, 37 percent would like to phase out target prices completely over a five- to ten-year period. Farmers over 50 years old show more support for raising target prices. Farmers under 35 and those with gross sales under $40,000 show more support for phasing out target prices.

Loan rates. Although 37 percent would like to see the loan rate based on the average of market prices to keep prices competitive, 40 percent called for eliminating loan rates and commodity loans completely. Respondents from 50 to 64 years of age showed the most support for eliminating loan rates and commodity programs.

Spending cuts. If further spending cuts had to be made in farm commodity programs, farmers are divided on how they would prefer to see them made. The largest number, about one-third of the group, would prefer to make payments only to small and medium-sized farms. But almost equal numbers preferred reducing target prices and deficiency payments, reducing the number of payment acres, or making payments based on financial need. Farmers over 50 and those with gross sales under $40,000 prefer payments to smaller farms. But more farmers under 35 years would like to base payments on financial need.

Increasing flex acres. Two-thirds of the farmers would like to be permitted to plant more flexible nonpayment acres and still retain the historic acreage bases for their program crops. Farmers with sales of $100,000 to $500,000 showed the highest preference for increasing flex acres.

Farmer-owned reserve. More farmers agreed than disagreed that the farmer-owned reserve should be continued. But one out of three respondents was not sure. A higher proportion of respondents with gross sales over $250,000 favored continuation.

Revenue assurance plan. Farmers were divided on the merits of the Iowa Farm Bill Study Team proposal for a revenue assurance program in which each producer is assured 70 percent of normal crop revenue. The proposed program would eliminate target prices, acreage reduction programs, federal crop insurance, and disaster assistance, but it maintains nonrecourse commodity loans and grain reserves. While 39 percent agreed with this plan, 25 percent disagreed and 31 percent were not sure. Among farmers from 35 to 49 years of age, nearly half agreed with this concept. Because this plan is quite revolutionary in many ways compared to current price and income support programs, the amount of support among respondents suggests that this plan will get serious discussion during the 1995 farm bill development.

Dairy program. Should the dairy program be financed by milk producer assessments and administered through a producer marketing board with the power to control production? About twice as many agreed than disagreed with this plan. Because only 4 percent of the respondents reported dairy as their main source of income, it is not surprising that 42 percent were not sure how they thought the dairy program should operate.

Conservation Reserve Program. One of the major issues in 1995 farm and food legislation will be what to do with the 36 million acres under conservation reserve program contracts that expire beginning in late 1995. The most preferred policy by about one-third of the respondents would be to extend some contracts with new bids on the most erodible acres. About one-fourth of the respondents would like to extend all contracts a few years at the current payment rate. About one-fifth would like to discontinue the program. Others would like to replace this program with incentive payments for a conservation and water quality program.

Conservation compliance. In 1985, Congress established conservation compliance and required that approved conservation plans be implemented by January 1, 1995. About three out of five respondents agreed that the program should be continued. A higher proportion of respondents with gross sales between $100,000 and $500,000 favored continuation.

Water quality regulations. Should the government regulate specified farming practices and land uses to reduce pollution of underground and stream water? Respondents were definitely divided on this issue with more opposing government regulation than approving. More than half of all respondents with gross sales over $100,000 opposed regulations that specify farming practices and land use.

Grass protection strips. To protect water quality, should farmers be required to plant grass protection strips along stream banks and waterways? A majority of respondents agreed that this would be appropriate. However, a majority of those with gross sales over $250,000 opposed the idea.

Compensation for planting grass protection. If farmers plant grass protection strips along stream banks and waterways, about two out of three agreed that they should be compensated.

Government regulations and farm property values. If government regulations reduce the value of farm property, should the owner be compensated for this loss? More than three out of four respondents agreed that the owner should be compensated.

Changes in pesticide use. The use of agricultural pesticides and their effect on water quality and food safety has become a major issue. When asked about the amount of agricultural pesticides they were using compared to five years ago, half reported they were using less in terms of active ingredients per acre, one third were using about the same amount, and only 3 percent were using more. The remainder did not know or did not reply. Respondents from 35 to 49 years of age and those with gross sales over $100,000 had decreased pesticide use more than other groups.

Pesticide application records. Should farmers be required to keep application records on their use of all agricultural pesticides? About half of the respondents agreed that they should, one-third disagreed, and the remainder were not sure or did not reply. A majority of respondents under 50 years of age supported keeping records while a majority over 50 did not.

Wetland conservation. Should farmers be permitted to drain wetlands and plant crops on these lands? Almost half of the respondents opposed any prohibition on draining wetlands and planting restrictions on these lands. About one-third approved of a prohibition. Smaller operators support wetland preservation more than operators with large sales volumes. High-school graduates and those who had attended college were more opposed to restrictions than other respondents.

Disaster assistance

Government role. Should the government protect farmers from natural disasters such as droughts and floods? Farmers are definitely divided on this question. About half of the respondents favored farmers buying private crop insurance if they wanted protection, getting the government out of crop insurance and special disaster assistance. The other half were divided between having Congress decide each year about disaster programs, developing a permanent disaster program when losses exceed 50 percent, and setting up a mandatory crop insurance program for all farmers as a condition of eligibility for additional disaster payments. More younger farmers favored a permanent disaster assistance program while more older farmers supported a mandatory program to be eligible for additional disaster payments.

Preferred crop insurance program. If the government were to offer a subsidized crop insurance program and no disaster assistance, three out of five respondents favored letting farmers buy crop insurance on a voluntary basis, paying for coverage based on individual farm yields. About one out of four favored a voluntary program with lower premiums that would base premiums and payments on county yields. Farmers over 65 years of age showed more support for an insurance program based on county average yields.

International trade

Multilateral and bilateral agreements. Although the North American Free Trade Agreement has been ratified and the General Agreement on Tariffs and Trade (GATT) is expected to be in place by early 1995, about three out of four respondents support continued negotiations for bilateral and multilateral agreements to reduce trade barriers. A higher proportion of those with more formal education supported more trade negotiations.

Subsidized export sales. Subsidized export sales by the European Union (formerly called the European Community) have led to export subsidies by the United States. Farmers are divided on whether the United States should continue to subsidize export sales of agricultural commodities. About one-half of the respondents favor continued export subsidies for agricultural products. More than one-fourth of the respondents were not sure, and the remainder disagreed or did not respond. Respondents under 50 years of age and those with gross sales between $100,000 and $500,000 showed more support for continued export subsidies.

Subsidies for value-added products. Should the United States subsidize exports of value-added products such as meat, flour, and similar processed commodities rather than bulk commodities? Respondents were definitely divided on this question. About four out of ten were not sure, and the remainder were about equally divided between support and opposition. However, a higher proportion of farmers under 50 years of age, those with over $250,000 gross sales, and those with part of their gross sales from livestock or dairy agreed that value-added exports should be subsidized. More older farmers disagreed or were not sure.

Foreign food aid. Should the United States continue to decrease its funding of foreign food aid? Almost half of the respondents agreed, about one-fourth disagreed, and the remainder were not sure or did not reply.

Biotechnology value. Will biotechnology—the use of living organisms, plants, animals, and microbes to develop different traits in plants, livestock, and poultry—be beneficial to producers? Three out of five respondents said it is, one out of four were not sure, and the rest disagreed or did not reply. Younger farmers and those who had attended college showed much more support for biotechnology.

Agricultural biotechnology for consumers. Will agricultural biotechnology be beneficial for consumers? Three out of five respondents believe it will be, about one-fourth are not sure, and the rest disagreed or did not reply. Those who had graduated from high school were more supportive than others.

Subsidized fuels. Should tax money be used to subsidize fuels—such as ethanol and soy diesel—developed from plants? Two-thirds of all respondents said yes; the rest were not sure, disagreed, or did not reply.

Targeted agricultural research. Should government-supported agricultural research be targeted to benefit small and medium-sized farms? Two-thirds of the respondents said yes, about one-sixth were not sure, and the remainder disagreed or did not reply. However, operators with a large volume of sales do not support this idea.

Funds for rural development. Should the federal government increase funding for programs to expand employment and economic activity in rural areas? Three out of five respondents believe that it should. Another one in five are not sure. The rest either disagreed or did not reply.

Most important rural development needs. Respondents were asked to list the most important needs for economic development in their area. The most important needs mentioned in order of frequency were (1) more support for public education, (2) new or improved roads, (3) business development, (4) more law enforcement and crime prevention, (5) improved health-care facilities, and (6) public training to improve workers' skills.

Food aid, food safety, and nutrition

Food stamps or cash payments? Because food programs take more than half of USDA's budget, respondents were asked if food programs should be shifted to cash grants to let states distribute the funds. Nearly half of the respondents favored cash grants, about one-fourth disagreed, and the remainder were not sure or did not reply. Respondents over 65 years of age showed less support for cash grants.

Food stamp eligibility. Should food stamps be distributed only to the elderly and families with children if the family income falls below poverty level? Three out of four respondents said yes, and the others were about equally divided between disagreeing and not being sure.

Cooking instructions. Should all meat and meat products sold at retail stores carry instructions for proper storage and cooking? Three out of four respondents definitely agreed; the rest were not sure, disagreed, or did not reply.

Food inspection. Should food inspections be strengthened to ensure safer and better-quality foods? More than three out of four respondents said a definite yes. The rest were not sure, disagreed, or did not reply.

Standards for imported foods. Do imported foods and beverages meet the same safety requirements as domestic products? Almost half of the respondents agreed that they do, one-fourth were not sure, and the remainder disagreed or did not reply. Younger respondents under 50 years of age were more doubtful about whether imported foods met the same safety standards as domestic products.

USDA food pyramid. Had respondents seen the USDA food pyramid with guidelines for proper nutrition? About four out of ten said they had, a few more had not, and about one out of ten was not sure or did not reply. Fewer respondents under 35 years of age and those who had not finished high school had seen it.

Usefulness of food pyramid. Among those who had seen the food pyramid, six out of ten said they thought it was useful. The others said no or were not sure.

Food labels. Should food labels be required to contain more diet and nutrition information? About six out of ten respondents said yes, about one out of five were not sure, and the rest disagreed or were not sure.

Reading food labels. How much do farmers read food labels? About four out of ten respondents read them often, about half do occasionally, and the rest never read them or did not reply. Respondents over 50 years of age reported more frequent reading of food labels.

Personal profile

Age. Three-fourths of all respondents were between 35 and 64 years old. Only 7 percent were under 35, and 17 percent were over 65.

Annual gross sales. About one-third of the respondents had gross sales under $40,000 and half between $40,000 and $250,000. The remainder had sales over $250,000 or did not respond.

Education. Among all respondents, 42 percent had completed high school, and 45 percent had additional college or technical school.

Major source of farm income. Grain was the main source of farm income for three out of five respondents. The others reported hogs, beef or sheep, mixed grain, and livestock and dairy as major income sources. Half of the respondents reported no income from livestock, dairy, or poultry. About one-fourth reported between 1 and 25 percent farm cash receipts from livestock.

Off-farm income. Income from off-farm sources can be important for many farm families. Three-fourths of the respondents reported some off-farm income. One-fourth reported off-farm income under $10,000, one-third reported from $10,000 to $40,000, and about one-eighth had over $40,000 in off-farm income.

Government program participation. About three-fifths of the respondents participated in the feed-grain program. Others participated in the wheat, conservation reserve, disaster, wool, and farmer-owned reserve programs.

Land tenure. Respondents report a wide range of land tenure situations. About one-fifth of the respondents owned none of the land that they farmed. Almost four out of ten owned 75 percent or more of the land they farmed. The remainder owned part of the land they operated.

Farm organization membership. More respondents reported membership in Farm Bureau than any other organization. The soybean, corn, pork, milk and cattle producers associations were also represented.

Acknowledgments

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Issue 94-10 *October 1994*

Renewing the Farm Lease

This is the time of year when both farm operator and landowner should think about renewing next year's farm lease. In the past, a few landowners fired their tenants on short notice, making it very difficult—if not impossible—for them to find other farms to rent. If a farm operator was renting from only one landowner and had no farmland of his own, the farmer was really dispossessed, looking for other work and another place to live. This was deemed patently unfair, and the legislature passed a law stating that if a landowner terminated a verbal lease, it had to be done in writing at least four months before the end of the lease. That way, the farmer would have a reasonable amount of time to make other arrangements for farming and a place to live if he was living on the farm where the lease was being terminated.

Suppose a farm operator has a verbal lease with a landowner running on the normal farm-lease year from March 1 to the last day of February in the following year. In order for either party to terminate the lease, written legal notice must be presented to the other party on or before November 1. If wheat has been planted for harvest the following year, the tenant whose lease is being terminated may be able to agree with the landowner on proper compensation for the wheat that has been planted. If the two parties cannot agree on compensation, the law allows the old tenant to come back and harvest the wheat, taking his normal share and giving the landowner his normal share. The tenant should be compensated at reasonable going rates for work done for the following year's crops or for fertilizer applied for crops for the following year prior to notice to vacate the lease. The landowner may be able to collect this compensation from the following tenant; but the landowner is responsible for such compensation to the leaving tenant, not the new tenant, because any such agreements are between the leaving tenant and the landowner.

If there is a written lease, a termination date must be written in the lease. Suppose it is a one-year lease from March 1, 1994 to February 28, 1995. Then the termination date is February 28, 1995, and no other notice of termination is necessary. The farmer who wants to rent that farm for the following year must get a new lease or a written extension from the landowner. If the lease terminates and the landowner allows the farmer to continue farming the land under the previous terms or under different terms stated verbally, the lease becomes a continuing lease and is treated in the same way as a verbal lease.

Our lease survey shows that most cash-rented farms have a written lease. Clearly, when the cash rent is adjusted, there should be a new written lease. Our survey shows that there are many written crop-share leases, but the majority are either verbal or continuing leases. We believe the higher number of verbal leases have been practiced with the crop-share lease because the rent is self-adjusting. When the landowner receives a share of the crops, yields and prices vary from year to year, so rent automatically adjusts with crop and economic conditions.

We recommend that all leases be written. When the terms of the lease are written and can be referred to, there is generally less disagreement between the parties about the

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lease arrangements. Also, if either party dies during the lease year, a written lease makes it easier and more understandable for heirs of the deceased party to complete the terms of the lease. Both crop-share and cash-lease forms are available at your local agricultural Extension office or through the Office of Agricultural Publications and Education, Information Services, 67 Mumford Hall, 1301 W. Gregory Drive, Urbana, IL 61801.

Actually, renewing a lease for the coming year should be a matter of continuing communication between the landowner and the tenant. The farmer should initiate and continue this discussion. As long as the landowner can easily find another good tenant, the farmer has the most to lose if communication breaks down.

All farmers are busy, but farmers should make it a part of their farming businesses to report periodically to their landowners. They can report when they finish planting, what seed was used, what and how much fertilizer was applied and why, soil test results, moisture and weather conditions, weed conditions, waterway or drainage conditions, herbicides applied, crop growing conditions, how well the crop is doing, when harvest is completed, and crop yields. The farmer should set up an appointment in August or September to visit with the landowner about the farm and the landowner's desires and requests. That time can then be used to renew the lease for the following year. Very few good farmers lose a lease when they communicate regularly with the landowner, understand and recognize the landowner's wishes, and try to carry them out.

On the other hand, the landowner owes it to a good tenant to contact the tenant when he perceives a problem and resolve it right away. Landowners can't expect tenants to read their minds. Remember that most farmers today are well educated, have a lot of good management experience, and a large investment in modern, well-maintained machinery. They are usually willing to work out the proper husbandry for your farm. Many landowners are now willing to provide a lease that runs longer than one year, often from three to five years, when they find an outstanding farmer and are confident that that farmer will do a good job. A longer-term lease is also good for the farmer because he can make machinery purchase commitments and develop conservation and fertility build-up programs for the farm that he might find too risky on a one-year lease. Our survey shows that many lease arrangements continue on the same farm as long as the farmer remains in business. On our lease survey, the average length of time that farmers farmed the same tract on a crop-share lease was 16 years.

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Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 94-11 *December 1994*

Variance in Corn Yields, 1950-1991

The yield per acre of corn production has been variable throughout time. This variability obviously affects the income of individual farm operators as well as the income of the farm landlord. There are ways to replace income lost due to poor production, but they seldom supplement income to "normal" levels. This lost income is never fully replaced.

The production of any agricultural commodity carries some degree of risk that an expected level of production will be reached in any year. These risks include temperature, rainfall, humidity, the optimal combination of seed, fertilizer, chemicals, and tillage practices for a given tract of land, and crop exposure to disease and weed infestations.

The risk of variability associated with production of corn is a critical input for the farm operator in his or her decision-making process about which crops to grow on a given tract of land. A crop that is thought to have a high level of risk in a given area will usually not be grown by the farm operator or will be grown on fewer acres; it may also be grown in the nature of a "secondary crop" in order to control the risk associated in the total farm operation. A secondary crop is one that the farm unit might not depend on for income to sustain the operation. The operator's decision to grow a secondary crop may not always be made on completely sound financial and economic information. For instance, a "hobby farm" might choose a production enterprise that has a great deal of risk associated with production because the farm does not depend on farm income to sustain the operation.

There are implications of this risk and yield variability that are obviously important to the farm operator and the farm landowner. These implications carry over into other far-reaching aspects of agriculture as well. The processor of farm commodities wishes for a secure and steady supply of commodities to assure long-run sustainability. The government has a large interest in this variability as it affects the budget of the USDA through its farm programs.

It is important to be aware of this relative variability in corn yields. Underestimating the significance of this variability could result in incorrect decisions by the farm operator that could adversely affect the farm operation.

The following tables and figures are used to identify changing variability in the yield per acre of corn in Illinois and each of the nine crop-reporting districts in the state. It becomes very clear that the trend of corn yields in the state has been on the increase from 1950 to 1991. However, the variability of corn yields reported has also increased greatly over that same time period. For our purposes, all of the factors that can affect corn yield were aggregated into one factor that shows the overall trend. The trend of corn yields has always been upward; each year we move forward in time has seen an increase in corn yields. It can be assumed that a driving factor of this yearly increase in corn yields is largely a result of the increasing use of technology and the rapid advances in that technology. The adaptation of higher levels of technology permits the operator to produce the same output but with lower levels of inputs.

This yield data was collected each year from 1950 through 1991 for all nine crop- reporting districts in Illinois (see Figure 1). The data was published annually by the Illinois Agricultural Statistics Service, which collects it on a voluntary basis from producers and other persons closely involved in production agriculture such as extension staff, farm managers, and FBFM field staff.

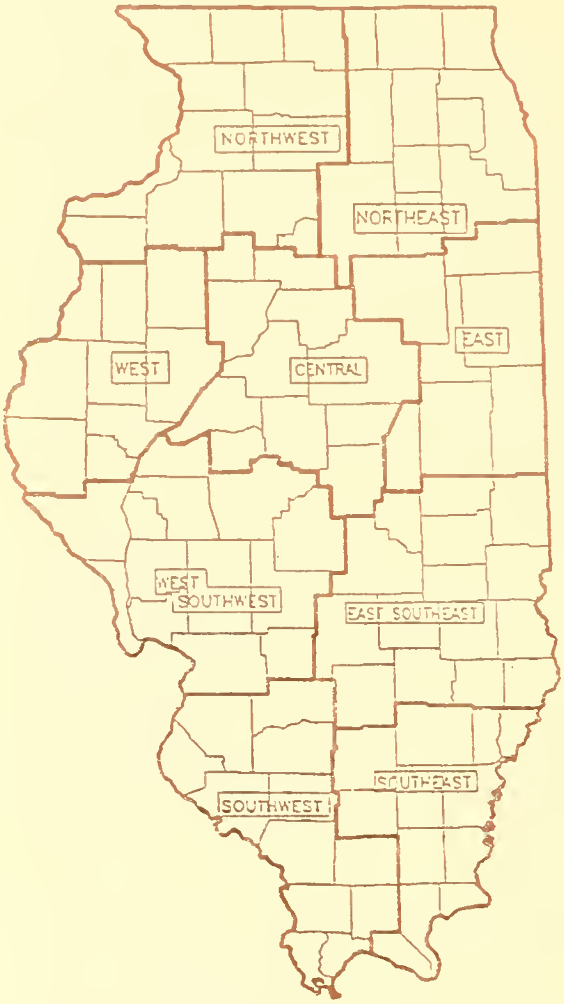
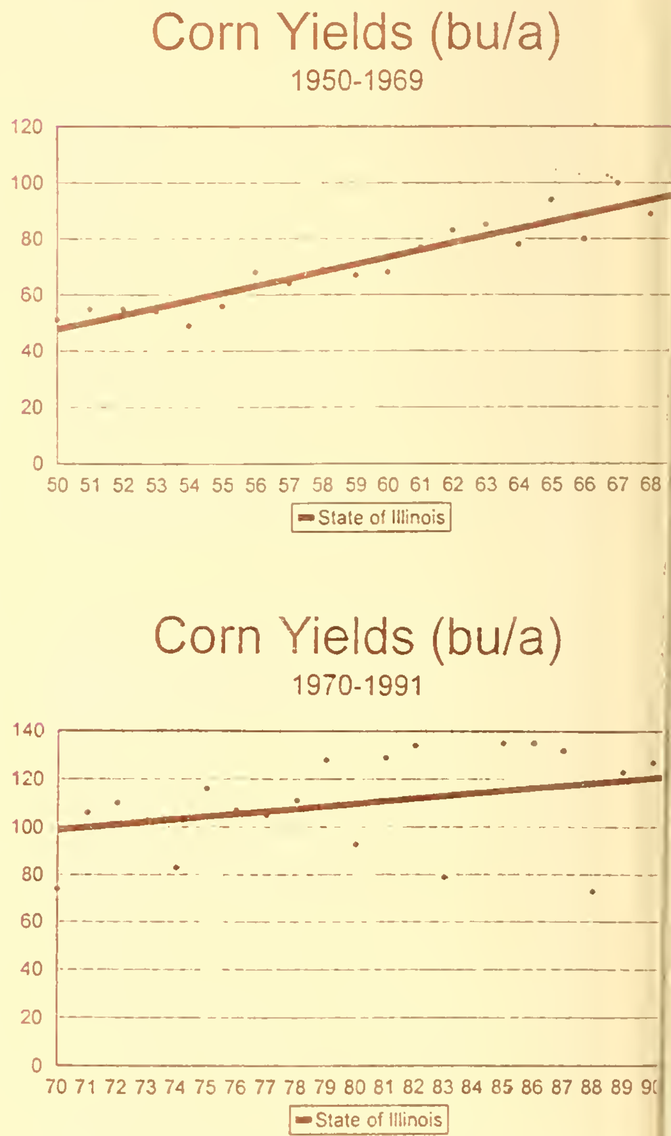


Figure 1. For statistical purposes the counties of Illinois are grouped into nine agricultural statistics districts (shown on the map above). These groupings represent divisions of approximately equal size with similar soils, growing conditions, and types of farming.

Through the time period, all nine districts show an increase in yield, but the increases are far from smooth and orderly when using linear regression analysis. All nine districts show that the variability in corn yields has increased markedly over the time period.

These increasing levels of variability lead one to look at the corn yields after they are divided into two separate periods. The two periods are 1950 to 1969 and 1970 to 1991 (Figure 2). The division was made at this point because commercial fertilizers came into wide and intense use in the late 1960s and early 1970s. As you can see, the variance in corn yields from 1970 to 1991 is much greater than the variance from 1950 to 1969. This variance is assumed to be associated with the risk of producing corn in the two time periods.



Source: Illinois Agricultural Statistics Service

Figure 2. Increase in variability of corn yields from 1950 to 1991.

The variability listed in Table 1 is in terms of "bushels" of variability per acre with the increase in variability in percentage terms.

The amount of variance, especially in the 1970-1991 period, makes one wonder if the relationship between time and corn yields is a straight line or more of a curve showing signs of leveling off in recent years.

The largest increases in the variability of corn yields between the two periods have been confined primarily to the northern and central portions of the state. The largest increases were seen in the northeast, northwest, west, central, and east districts. The lesser increases in variability of corn yields were seen in the east-southeast, southeast, southwest, and west-southwest districts.

These data suggest that it is more risky to grow corn in the northern and central parts of the state; however, this may not be true. The levels of variance in corn yields in the southern part of the state, specifically east-southeast, southeast, southwest, and west-southwest, show that the variability in these districts was at higher levels in the earlier period as well as in the later period. It appears there has always been an increased level of risk associated with growing corn in the southern part of the state as compared to the northern and central parts of the state. The variance in corn yields in southern Illinois in both time periods has always been large. The variance of corn yields in central and northern Illinois was much lower from 1950 to 1969 but is much higher in the 1970 to 1991 period. In essence, the variability of corn yields in the central and northern parts of the state seem to have "caught up" with the variability in the southern part of the state.

This analysis is significant for several reasons. It is useful information as farm operators plan cropping decisions that are based on some kind of risk assessment associated with growing a crop. It also lets the operator make contingency plans if necessary, such as implementing hail and/or multiple-peril crop insurance that allows the operator to manage the risk. It could also be argued that the increasing variance makes an even better case for the operator to carry crop-hail insurance as well as multiple-peril crop insurance with high pricing factors as much as possible.

The current feed-grain program must also be considered. With the current Commodity Credit Corporation loan program, there is still a price

Table 1. Variability of Corn Yields

Crop district	Total 1950-1991	1950-1969	1970-1991	Percent increase
		bushels per acre		
Northwest	14.585	4.518	16.807	272.0
Northeast	15.437	3.501	17.747	406.9
West	17.679	7.171	19.612	173.5
Central	17.702	7.189	19.583	172.4
East	20.372	8.754	21.433	144.8
West-southwest	17.251	15.514	17.331	11.7
East-southeast	17.870	14.331	19.043	32.9
Southwest	19.571	17.078	19.856	16.3
Southeast	20.153	16.176	20.926	29.4
State	15.926	7.459	17.243	

floor at the loan rate. Because the CCC loan is non-recourse (or forfeitable), it gives support for this price floor. With this support in place, some of the price variance assumed to be associated with yield variance may not be realized. Thus, the producer might not see the need to deal with the negative consequences of production risk. This might also explain in part the low usage of multiple-peril crop insurance in the past.

This increase in the relative variance of corn yields will obviously affect the rate of return for the farm operator who owns land as well as for the farm landlord. The returns in the future will probably be just as volatile as the yields, and this is expected to affect land prices and rental rates as well. As corn yields continue a slow uptrend with an increasing variance in those yields, one could argue that land rents and land prices will also continue a slow upward trend with increasing amounts of variation. Remember, this data is based on a statewide study, and local land rents have many local influential factors. This makes the process of renting or purchasing additional acreage a meticulous task in light of the variations.

In summary, it is important to the farm operator and farm landlord to be aware of the risk associated with corn production. This production along with the price of the crop are the basis of the returns available to sustain the producer and landlord. The effects of the variability in corn production can be offset if the producer is aware of the magnitude of the risk and can reduce the risk to an acceptable level.

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Issue 95-1 *January 1995*

Risk Management and the Crop Insurance Reform Act of 1994

The Crop Insurance Reform Act of 1994 is the most significant change in farm programs for 1995. The six key components are catastrophic crop insurance coverage, additional Multiple Peril Crop Insurance coverage, linkage to farm programs, delivery, uninsured crops, and the repeal of standing disaster assistance.

Catastrophic coverage

The new catastrophic (CAT) crop insurance makes available to growers of insured crops coverage for prevented planting as well as for crop losses, but not for replant. The program provides individual policies offering levels of coverage relatively similar to what disaster assistance has provided in past years.

Coverage will be based on the Actual Production History Plan (APHP) of Multiple Peril Crop Insurance (MPCI). If a producer does not have prior years' production records available, guarantees will be based on yields in the years for which he or she has records and a percentage of a transitional yield for the years that production records are unavailable. The base period is a minimum of four and a maximum of ten consecutive years, beginning with 1994. If there are fewer than four years of actual production history, the yield used in the insurance contract will be adjusted using yield records that are available for the farm along with county or area average yields.

This policy guarantees 50 percent of a producer's average yield at 60 percent of the expected market price established by the Federal Crop Insurance Corporation (FCIC) for that crop. The cost of this coverage to the producer is $50 per crop per county, up to $200 per producer per county, to a maximum of $600 per producer for all counties. The USDA will fund the cost of any additional premium beyond these limits for an individual producer who exceeds them individually or in a county.

The sign-up deadline for this new program is **March 15.** Note that this is one month earlier than in past years. All premiums for CAT coverage will be due at the time of sign-up. CAT coverage is available from your local county Farm Service Agency (formerly ASCS) and from private crop insurance agents. These policies provide continuous coverage, which means that unless you decline to engage the coverage in future years, it will continue year to year with no further action on your part.

CAT coverage is an individual insurance policy, and potential benefits are not dependent on multiple-state disasters or a budget-driven political process.

Additional coverage

The new law provides increased subsidies for higher coverage levels under both APHP and the Group Risk Plan (GRP). Under APHP, the producer provides actual crop yields and receives a policy based on that history.

GRP provides a policy based on average county yields rather than individual farm yields. Under GRP, the policyholder receives an indemnity payment when the county average yield is less than guaranteed. The producer's own yields are not considered in determining the yield guarantee or the losses. The GRP policy does qualify the producer to remain eligible for price support programs, certain Farmers Home Administration (FmHA) loans, and the Conservation Reserve Program. Although GRP was available in 1994, very few Illinois farmers signed up for it, and it will probably not be a popular choice again in 1995.

The disadvantage to GRP is that the policy provides no protection relevant to a producer's actual production in any given year. The advantages include less documentation, no requirement to provide production records, and no need to file a claim for payment. Keep in mind that with GRP you do not receive any payment unless the county average is less than the guarantee, no matter what your own yields.

Additional MPCI coverage is available from private insurance agents only. An MPCI policy at the acceptable coverage approved by FCIC excuses a producer from paying the $50 CAT coverage fee, but a $10 enrollment fee is charged. Rates for MPCI have yet to be determined for the 1995 crop. Contact your local crop insurance agent to learn rates as they become available.

MPCI can be purchased with either a 65 percent or a 75 percent yield guarantee, with coverage up to 100 percent of expected price. Like a CAT policy, MPCI provides continuous coverage: once a policy is originated, it remains in effect year after year until you decline the coverage. Premium rates for MPCI will, as in the past, depend on the level of coverage elected; they also vary depending on crops covered and county. The higher the producer's yield average, the lower the premium rate. If the producer elects to "buy up" coverage with MPCI, the enrollment fee is reduced to $10 per crop per county, as mentioned previously. As has been customary in MPCI programs, premiums will be due in the fall.

Under both CAT and MPCI, you can only insure acreage in which you have an interest. Cash-rented land cannot be insured by the landlord. Each person or entity sharing interest in a crop must purchase insurance coverage independently to assure program eligibility for that share. The landlord and tenant are not required to have the same insurance coverage on the same tract.

Some producers may consider dropping MPCI to purchase CAT alone, thinking they are reducing coverage by only 15 percent. This is not the case, however, since the CAT coverage reduces the production and price guarantees from those of MPCI. This combined price and production reduction will total more than a 15 percent reduction in the value of the policy. See Table 1 for estimated differences in indemnity payments for corn under various policies; consider especially the percentage increase in the value of the policy in buying up to MPCI.

The following crops are eligible for Federal Crop Insurance in Illinois in 1995: apples, barley, canning beans, corn, GRP corn, grain sorghum, green peas, hybrid seed corn, nursery stock, oats, popcorn, soybeans, GRP soybeans, sweet corn, tomatoes, and wheat.

Linkage to farm programs

The 1994 crop insurance legislation includes a "linkage" provision that requires all producers to be covered by CAT, an approved MPCI policy, or GRP to be eligible for price support programs, the Conservation Reserve Program, and any FmHA ownership, operating, or emergency loan programs. The legislation also changes the sign-up date for coverage—**March 15 is the last day to sign up** for both CAT and MPCI. This is one month earlier than in past years.

Under the linkage provision, a producer must carry a minimum of CAT coverage on all crops that contribute 10 percent or more of the total expected value of all crops grown by each producer. A producer may elect to include crops that contribute less than 10 percent.

Delivery

Farmers may obtain catastrophic coverage through private insurance agents or local USDA offices. Higher, or additional, coverages are generally available only from private agents.

Table 1. Estimated Indemnity Payments for Corn Under Catastrophic Coverage and Multiple Peril Crop Insurance

	CAT	Additional MPCI		
Coverage	50% yield, 60% price	50% yield, 100% price	65% yield, 100% price	75% yield, 100% price
Proven yield (bushels)	130	130	130	130
Yield guarantee (bushels)	65	65	84.5	97.5
Indemnity price ($/bushel)	1.26	2.10	2.10	2.10
Protection level ($/acre)	81.90	136.50	177.45	204.75
Yield at 60% loss (bushels)	52	52	52	52
Indemnity payment ($/acre)	16.38	27.30	68.25	95.55
Increase (%)	—	67*	150*	40*

This scenario assumes a $2.10 market price and FCIC price for corn.
*Entry records the percentage of increased coverage above that in the previous column.

Uninsured crops

The Noninsured Assistance Program (NAP) provides a level of catastrophic coverage for many uninsurable crops. Two things must happen for a producer to be paid under NAP. First, the average area yield for the crop must fall below 65 percent of the expected area yield established by FCIC. Second, the farm must experience losses in excess of 50 percent of the established farm yield. If both of these conditions are met, the producer will be paid for losses in excess of 50 percent of the established farm yield at 60 percent of the average market price for the crop.

The following crops are eligible for the Noninsured Assistance Program: asparagus, broccoli, cantaloupes, carrots, cauliflower, celery, hay, honeydews, hops, lettuce, millet, mushrooms, nursery in-ground, pecans, peppermint, pineapple, pistachios, spearmint, squash, strawberries, sweet cherries, sweet potatoes, and watermelons. Not all of these crops are grown in Illinois, but the plan will certainly apply to some Illinois crops. Although there is no fee, **growers of these crops must enroll their intentions to plant them by March 15**.

Repeal of authority for future disaster assistance

The Crop Insurance Reform Act replaces disaster assistance, which in the past has been an "off-budget" item, under the crop insurance program. In the past, all disaster payments were considered to be off-budget, meaning that the source of funding was the general treasury, not USDA funds. With reform, disaster assistance is now part of crop insurance and an on-budget item. All payments are funded in the appropriation from the Treasury to the USDA. Disaster assistance supplemental to MPCI and CAT coverage could be funded, if approved by Congress—but only at the expense of other USDA programs. On the USDA level, money traditionally used to fund disaster assistance will now fund catastrophic crop insurance (CAT), with the understanding that no other assistance will be provided in the event of future crop disasters.

Summary

This reform of crop insurance as we know it will force all producers to assess the levels of risk management that the new legislation affords. You should first assess the level that CAT coverage provides for your operations. From there you can determine if the coverage is adequate or if you need to purchase MPCI coverage to provide additional yield and price risk management.

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Issue 95-2 *February 1995*

Certified Farmland Assessed Values Up for 1995

Certified farmland assessed values are up again in 1995. The increase for soil productivity indexes 60 through 114 was restricted to 10 percent by the limit law enacted in 1986. The increase for indexes 115 through 130 averaged closer to 5 percent. The increases for indexes 115 through 130 are the actual increases in the 1995 calculated values. These certified values, issued to county assessing officials in May 1994, will be the bases for 1995 assessments.

After four years of steady decline in certified assessed values for farmland (1988–1991), values have now increased for four assessment years (1992–1995). The poor-performing farm economy of the early and mid-1980s, evidenced by weak commodity prices and high interest rates, resulted in significant downward pressure on values through 1991 assessments. The strengthened economic conditions in Illinois agriculture (relatively higher commodity prices and relatively lower interest rates) prior to the 1994 crop year put significant upward pressure on values through the 1995 assessment year. Continuation of the upward pressure will depend on the underlying strength of the farm economy. Weaker prices, rising interest rates, and higher production costs characterizing the current Illinois farm economy suggest assessments will move sideways or begin sliding downward beginning with 1996 certified farmland assessed values.

1995 Certified Assessed Values by Soil-Productivity Index

Table 1 lists the per-acre certified assessed values that assessing officers will use to determine 1995 values of farmland throughout Illinois. For comparison purposes, 1994 certified values are also presented. The 1995 assessed values on farms will be the bases for taxes paid in 1996. The indexes range from 60 to 130; the 1995 certified values range from \$10.75 to \$371.78 per acre. The assessor applies the appropriate certified value in calculating the taxable value of farmland in each farm tax parcel after determining the parcel's soil index and the use of the land in farming. The farmland assessment is added to assessments for buildings, building site, home, and home site to get the total taxable value on each farm parcel.

The certified values for 1995 in Table 1 are 110 percent of the values certified in 1994 for indexes 60 through 114 because the assessed values, calculated with the income capitalization formula required by the Illinois Farmland Assessment Law, were more than 110 percent of the 1994 values for soils in this quality range. For indexes 115 through 130, the 1995 certified values increased less than 10 percent, so the values actually calculated by the income capitalization formula were certified in 1995 for soils in this quality range.

The Income Capitalization Formula

The income capitalization formula required by the Illinois Farmland Assessment Law is

$$\text{Value} = \frac{\text{Gross income per-acre less per-acre nonland production costs}}{\text{Average Farm Credit Service mortgage interest rate}}$$

The formula uses data averaged over five years to calculate the per-acre certified assessed value for cropland. There is a two-year lag

Table 1. 1994 and 1995 Certified Farmland Equalized Assessed Values (EAV) by Soil Productivity Index

Productivity index (average management)[a]	1994 certified EAV ($/acre)[b]	1995 certified EAV ($/acre)[c]	Productivity index (average management)[a]	1994 certified EAV ($/acre)[b]	1995 certified EAV ($/acre)[c]
60	9.77	10.75	96	124.50	136.95
61	10.57	11.62	97	130.46	143.51
62	11.38	12.52	98	136.53	150.19
63	12.17	13.38	99	142.70	156.97
64	12.96	14.26	100	148.89	163.77
65	13.75	15.12	101	155.21	170.73
66	14.56	16.02	102	161.60	177.76
67	15.35	16.88	103	168.00	184.80
68	16.15	17.76	104	174.51	191.96
69	16.93	18.62	105	181.11	199.22
70	17.73	19.50	106	188.27	207.10
71	18.51	20.37	107	196.23	215.85
72	21.89	24.08	108	204.20	224.62
73	25.28	27.80	109	212.16	233.38
74	28.64	31.51	110	220.12	242.13
75	32.01	35.21	111	228.08	250.89
76	35.38	38.92	112	236.04	259.64
77	38.76	42.63	113	243.99	268.38
78	42.11	46.32	114	251.94	277.14
79	45.48	50.03	115	259.89	283.75
80	48.86	53.75	116	267.86	289.36
81	52.23	57.45	117	275.82	295.00
82	55.60	61.16	118	283.77	300.68
83	58.95	64.84	119	291.74	306.39
84	62.34	68.58	120	297.78	312.15
85	65.71	72.28	121	303.32	317.94
86	69.07	75.97	122	308.90	323.77
87	73.79	81.17	123	314.54	329.64
88	79.14	87.06	124	320.19	335.55
89	84.49	92.94	125	325.91	341.49
90	90.02	99.02	126	331.67	347.47
91	95.61	105.17	127	337.47	353.49
92	101.21	111.33	128	343.33	359.55
93	106.92	117.61	129	349.22	365.65
94	112.67	123.94	130	355.16	371.78
95	118.55	130.41			

Source: Illinois Department of Revenue, Certification Memos, 1994 and 1995.

[a]Average management productivity index is the average of the basic and the high-level management indexes as reported in *Soil Productivity in Illinois*, Illinois Cooperative Extension Service Circular 1156, 1978.

[b]110 percent of 1993 certified values for productivity index figures 60 through 130.

[c]110 percent of 1994 certified values for productivity index figures 60 through 114; certified values for productivity index figures 115 through 130 are actual calculated values.

between the assessment year and the last year of the data used. For example, the 1995 calculations, which had to be completed before May 1994, used data averaged from 1989 through 1993. Lags in data used for the mass appraisal of property for tax purposes are common. Since income and costs vary by soil quality, a separate calculation is done for each index.

Note the following consequences of the arithmetic of the income capitalization formula:

- Higher (lower) gross income caused by higher (lower) crop prices increases (decreases) the value.
- Lower (higher) nonland production costs increase (decrease) value.
- A lower (higher) average Farm Credit Service (FCS) mortgage interest rate increases (decreases) value.

It is relatively easy, then, to identify the general impact that changes in commodity prices and interest rates have on certified farmland assessed values. Values are directly related to crop prices and indirectly related to production costs and interest rates.

Why Did Values Increase Again for 1995? What about 1996?

Five-year-average commodity prices and nonland production costs put downward pressure on the 1995 certified values, while lower interest rates created upward pressure. Commodity prices are a major factor influencing the calculation of certified values. The relationship between commodity prices and calculated certified assessed values on farmland is direct; higher prices result in higher calculated values, and lower prices result in lower values.

Commodity prices for 1976 through 1993 are presented in Table 2. The five-year-average prices used in computing farmland certified assessed values are calculated from these. For example, the average price for the 1995 assessment calculation is the average of 1989 through 1993. For corn this is $2.39 and for soybeans it is $6.03; both of those five-year-average prices are lower than the 1988 through 1992 averages used to calculate 1994 certified values; thus, average commodity prices put downward pressure on 1995 certified farmland values.

Figures 1 and 2 present the five-year-average prices for corn and soybeans, respectively, used in the assessment calculations for 1981 through 1995. The decline in average prices that began in 1986 put downward pressure on the calculated assessed values. With the leveling of average prices in assessment year 1991 and upward price movements in 1993 and 1994, calculated assessed values have been pressured up by stronger five-year-average commodity prices. With the decline in average prices for the 1995 assessment year, the upward pressure on certified values from commodity prices was relaxed.

Table 2. Illinois Commodity Price Summaries, Calendar Years 1976 to 1993

Year	Corn ($/bu)[a]	Soybeans ($/bu)[a]	Wheat ($/bu)[a]	Oats ($/bu)[a]
1976	2.54	5.65	2.98	1.44
1977	2.07	6.84	2.19	1.32
1978	2.12	6.32	2.93	1.28
1979	2.43	6.96	3.75	1.43
1980	2.78	6.90	4.02	1.58
1981	2.99	7.03	3.79	1.99
1982	2.43	5.88	3.12	1.92
1983	3.04	6.86	3.36	1.95
1984	3.13	7.14	3.34	1.81
1985	2.53	5.53	3.17	1.70
1986	2.00	5.09	2.80	1.26
1987	1.61	5.16	2.69	1.67
1988	2.32	7.28	3.41	2.30
1989	2.49	6.74	3.99	1.92
1990	2.46	5.92	3.09	1.29
1991	2.42	5.72	2.72	1.20
1992	2.34	5.64	3.34	1.53
1993	2.25	6.12	3.17	1.59

Source: Illinois Crop Reporting Service.
[a]Price used in farmland assessment computations.

The 1989 price for corn ($2.49) and for soybeans ($6.74) will be replaced by 1994 prices in the 1996 assessment calculations. Because the 1994 commodity prices will be less than the 1989 prices, the five-year-average prices used in the 1996 certified farmland assessed calculations will be lower than those used for 1995 calculations. The pressure for lower assessments from lower five-year-average commodity prices, which began with 1995 certified value calculations, will continue with the 1996 calculations.

Another major determinant of certified assessed values is the five-year-average FCS mortgage interest rate, used as the capitalization factor in the formula. There is an inverse relationship between the capitalization factor and the calculated assessed values; a higher interest rate results in lower calculated assessed values, and a lower interest rate results in higher calculated assessed values. The five-year-average interest rates by assessment year are presented in Figure 3. Beginning with assessment year 1981, the interest rates increased steadily through assessment year 1988. Higher interest rates combined with weak commodity prices to put substantial downward pressure on the calculated assessed values. However, with the 1989 assessment year, lower interest rates began to put upward pressure on the values.

Beginning in assessment year 1992, stronger five-year-average commodity prices combined with lower five-year-average FCS mortgage interest rates to put significant upward pressure on calculated assessed values for farmland. The pressure was great enough to trigger the 10 percent limit law, restricting the increase in certified values from 1992 to 1993. The increase was limited to 10 percent again in 1994 as stronger prices and lower interest rates combined with increases from 1992 and 1993 assessment years not yet included in certified values, driving the 1994 calculated values above 1993 certified values by substantially more than 10 percent. For 1995 the 10 percent restriction was imposed for soil productivity indexes 60 through 114 but was not binding for indexes 115 through 130. The net income component was lower in the 1995 calculations than in the 1994 calculations. The upward pressure on the 1995 certified farmland assessed values came entirely from the lower capitalization rates and the inclusion of prior year increases in the 1995 values.

Future Farmland Assessments

Changes in farmland assessments for the rest of the 1990s will be directly linked to the performance of the farm economy! Strengthened economic conditions will move assessments up. Weak fundamentals will put downward pressure on certified values. Remember, the values in Table 1 are for assessment year 1995, based on data averaged over 1989 through 1993. The 10 percent limit law restricted the increase in certified assessed values in 1992, 1993, and 1994.

The upward pressure from lower five-year-average FCS mortgage interest rates more than offset the downward pressure from lower five-year-average commodity prices, yielding higher 1995 certified farmland assessed values. Continued upward pressure on calculated values from lower five-year-average FCS rates for 1996 and 1997 is likely. The unknown is whether the positive impact of these lower rates will neutralize the combined negative impact of weaker five-year-average commodity prices and stronger five-year-average nonland production costs. If these factors offset each other, certified values in 1996 and 1997 will show little movement from the 1995 values.

Figure 4 traces the certified and calculated assessed value for soils with an index of 120 from assessment year 1981 through assessment year 1994, with some projections through assessment year 1997. Between 1981 and 1986, the certified value was equal to the calculated value. The 10 percent limit law changed this. Beginning in 1987, the certified value was greater than the calculated value through 1990 assessments because the 1986 limit law restricted the decline from one year to the next to 10 percent. For this soil, the calculated and certified values were identical or very close in 1991 and 1992. Because of stronger commodity prices and lower interest rates, in 1993 and 1994 the calculated values were above the certified values. The 10 percent limit law was working on the up side, limiting the increases between 1992 and 1993 and between 1993 and 1994 to 10 percent.

The calculated and certified values were identical again in 1995 for this soil index and up slightly from the 1994 certified value. The calculated value was lower in 1995 than in 1994, indicating that the increase in 1995 was all from prior year increases and not from changes in underlying conditions of the farm economy.

Projections for assessment years 1996 and 1997 show certified values equaling calculated values, with little movement from the 1995 values. These projections are made from the expectation that the forces described earlier will offset each other: lower average corn and soybean prices and higher average nonland production costs pushing against lower average mortgage interest rates. The projected sideways movement in certified values for 1996 and 1997 depends on the movement of economic fundamentals in the farm sector. Certified values could move up with a vigorous recovery in commodity prices and no offsetting increase in mortgage interest rates. If commodity prices do not recover from their current low levels in the next two years or so and if mortgage interest rates move up rapidly, downward pressure will resume on certified farmland assessed values.

Under this scenario, certified assessed values would show some weakness, following the poor performance of the underlying fundamentals of the Illinois farm economy. Strengthened commodity prices and no major drop in mortgage interest rates would boost certified farmland assessed values. The likelihood of stable certified farmland assessed values in 1996 and 1997 is reasonably good, given expected

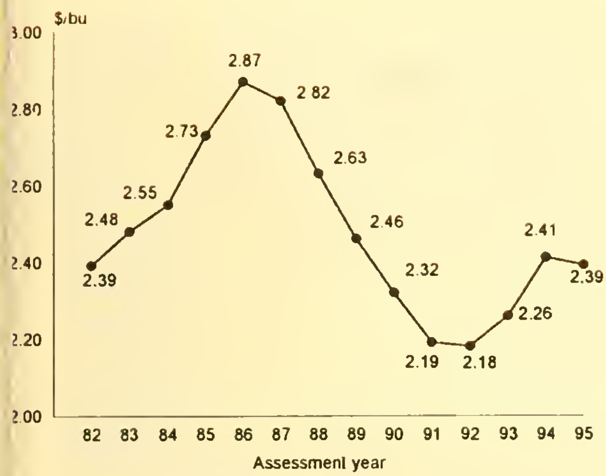

Figure 1. Average corn prices for assessment.

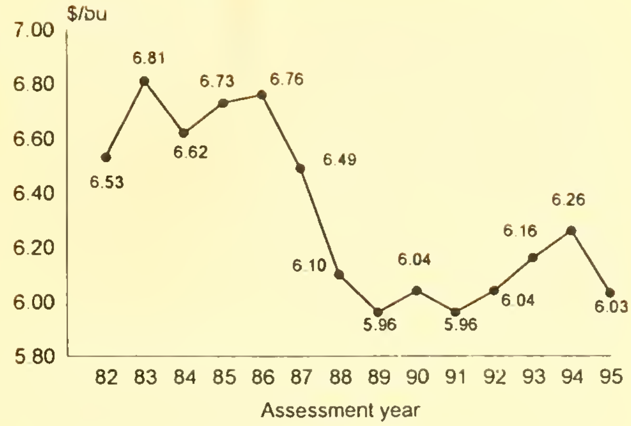

Figure 2. Average soybean prices for assessment.

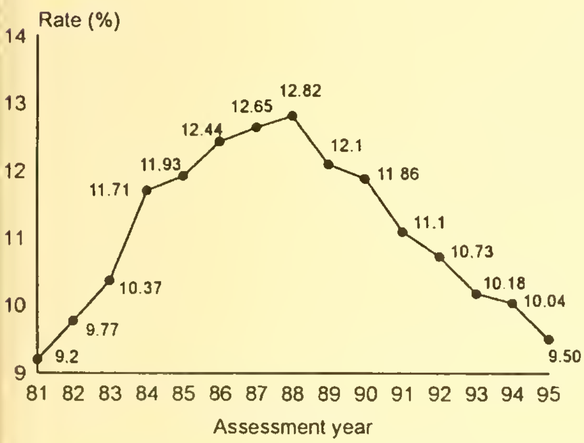

Figure 3. Farmland assessment capitalization rates.

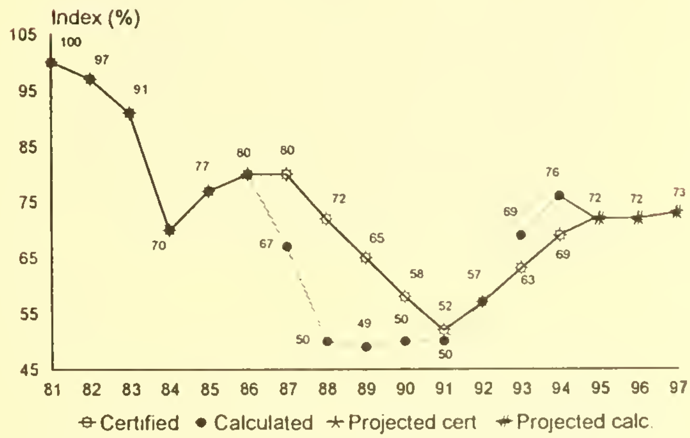

Figure 4. Index of certified and calculated assessed values for soils with a productivity index of 120, 1981 to 1995, with projections for 1996 and 1997.

changes in five-year-average prices and five-year-average interest rates. Keep in mind that the 1996 and 1997 certified values will be the bases for property tax bills paid by farmland owners in 1997 and 1998, respectively.

Future Property Tax Bills

Four years of higher certified assessed values on farmland have been welcomed by rural school boards, townships, and county governments but are disturbing to farm property taxpayers. By the same token, the prospect of weakening farmland assessments worries school board members and local elected officials in rural areas.

An increase in certified values need not translate into a comparable increase in tax bills payable. Only the budgeting process of schools and local governments will determine the impact of stronger farmland assessed valuations in 1994 and 1995 on farm property taxes due in 1995 and 1996. However, history suggests property tax bills are very, very sticky downward when assessments are declining and very, very robust upward when assessments are increasing.

The windfall from rising property tax assessments captured by local governments in Chicago's five "collar counties" was the major cause underlying a cap imposed by the Illinois General Assembly in 1991, limiting increases in property tax extensions in those counties to the rate of inflation or five percent, whichever is less. The cap will likely be extended to Cook County, and there is growing support for extending it to the rest of Illinois in 1995. How local governments in rural Illinois deal with the higher farmland assessments will have a great deal to do with the call for extending the property tax extension cap statewide. Such a cap has important implications for taxpayers and for the fiscal outlook of state and local governments. Illinois depends heavily on the property tax to fund schools and local governments. A tax cap will have the most dramatic impact on schools and other taxing bodies that have no alternate sources of revenue.

Taxpayer involvement in the budgeting process of taxing bodies would seem to be prudent to temper the impact of higher farmland assessed values on farm property tax bills. Remember that the local government and local school spending financed by property taxes drives the level of those taxes in any area. The assessment system simply distributes the cost of this spending among property owners according to the relative assessed valuation of their property.

For four years the 10 percent limit law held certified assessed values on farmland above the level prescribed by underlying economic conditions. Then for four subsequent years the certified assessed values have increased, with the 10 percent limit law holding values for most indexes below where they would otherwise be in three of the four years. As intended by the the 1981 Illinois Farmland Assessment Law, the assessed value on farmland reflects in a general sense the underlying aggregate economic conditions of Illinois agriculture, tempered by the 10 percent limit law, which provides some stability for both taxing districts and farmland property taxpayers.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 95-3 *March 1995*

Stronger Assessments Lead to Higher Farm Property Tax Burden in Illinois

Property tax reforms continue to occupy center stage for taxpayers, policy makers, and local governments. There is a growing call for reform to balance Illinois's public finance system and shift away from the property tax to fund local schools, but there is no agreement yet on exactly how. Acceptable alternatives are a challenge to design; all have some dimension that is undesirable. To lower Illinois's reliance on property taxes for schools while simultaneously increasing the state's share of the cost of public education requires significant increases in state income or sales tax rates, or both. The likelihood of eventual increases appears to be high to address both tax reform and the backlog of unpaid bills owed by state government. Natural revenue growth from a stronger economy will help, but the increased funds may not be enough to pay overdue health service bills, increase state school funding, and reduce property tax reliance all at once.

Information about the Illinois property tax and the state and local government finance system is key to the debates about tax reform, tax swaps, and school finance. The average per-acre taxes paid on Illinois grain farms in 1976 through 1993, with forecasts through 1995, are presented in Figures 1, 2, and 3. These data provide an excellent historical view of farm property taxes in Illinois. Figure 4 presents per-acre farm property taxes for each state in the United States for 1992 (the most current data available), making comparisons possible between Illinois and other states.

The average per-acre tax paid on Illinois grain farms was virtually the same in 1988, 1989, and 1990 ($14.98, $14.99, and $15.01, respectively). The averages were down slightly in 1991 ($14.44) and 1992 ($14.06). The sideways-to-downward movement reflects declining assessments, which began in 1987, combined with upward pressure on average farmland tax rates. These weak assessments reflected poor performance by the Illinois farm economy in the 1980s. The average payment in 1993 was up slightly, to $14.59. As the farm economy recovered in the early 1990s, assessments began to strengthen; without offsetting rate reductions, per-acre payments followed assessments up.

Stronger assessments in 1993 and 1994 underlie the increases in average per-acre farm property tax payments forecast for 1994 ($16.05) and 1995 ($17.65). Upward pressure from stronger assessments is expected for the payments in 1996 as well, but the increase will likely moderate somewhat; because of weakening economics in Illinois agriculture, the growth in 1995 assessments was somewhat less than in the previous two assessment years. These forecasts do not include any rate increases. Higher rates, which are likely in many downstate taxing districts, will put additional upward pressure on farm property tax payments. Thus, the forecasts likely underestimate the actual payments farmland owners can expect.

Schools and other taxing bodies could of course adopt offsetting reductions in their property tax rates and relax the upward pressure. However, this will likely occur only with significant pressure from taxpayers because property tax rates are very, very sticky downward.

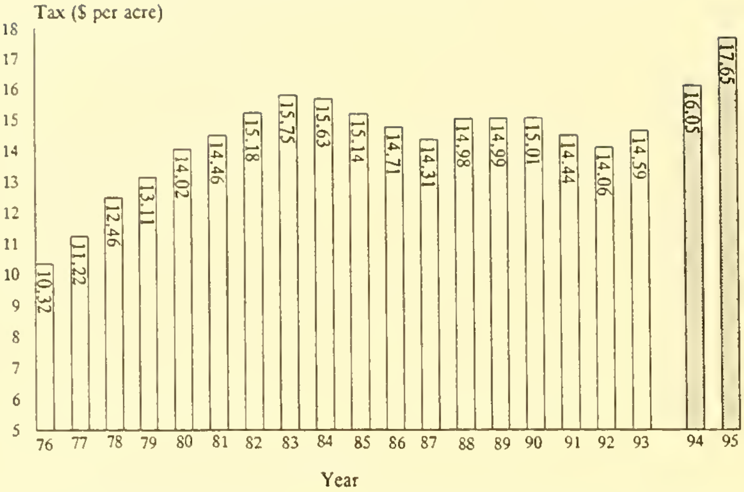

Figure 1. Per-acre property taxes on Illinois grain farms, 1976 to 1993, with forecasts for 1994 and 1995.

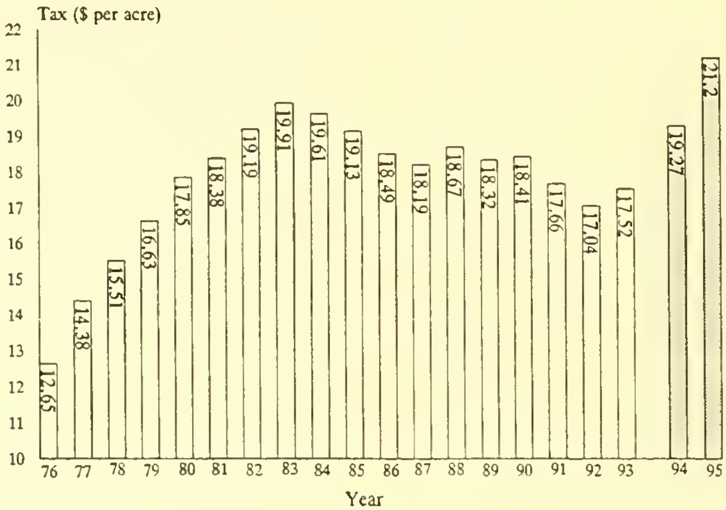

Figure 2. Per-acre property taxes on northern and central Illinois grain farms, 1976 to 1993, with forecasts for 1994 and 1995.

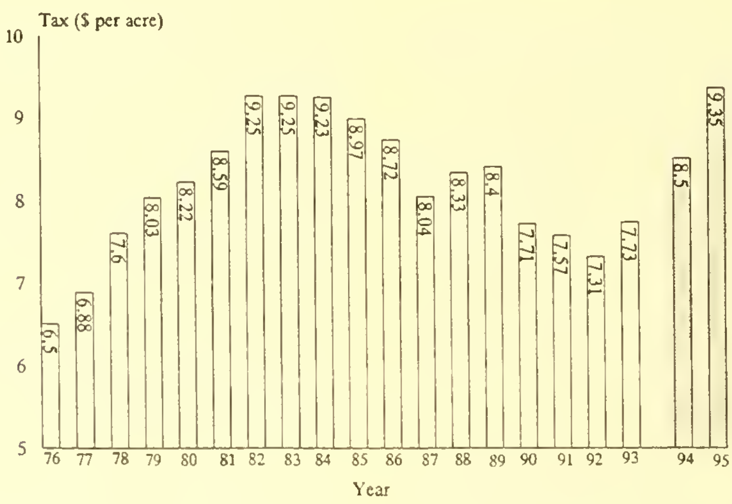

Figure 3. Per-acre property taxes on southern Illinois grain farms, 1976 to 1993, with forecasts for 1994 and 1995.

Per-Acre Taxes Across the State

Figure 1 shows per-acre property taxes from 1976 to 1993 for a sample of grain farms in Illinois's 68 northern and central counties and 34 southern counties. The data for the entire state are then subdivided into the two regions in Figures 2 and 3. In 1993, the sample included 1,915 grain farms, totaling 1.71 million acres. In 1993 average per-acre taxes on southern Illinois grain farms were 53 percent of the state average. On northern and central Illinois grain farms they were roughly 120 percent of the state average. Average payments in the southern Illinois counties showed a $.42 increase (5.7 percent growth) from 1992 to 1993, while in the northern and central Illinois counties payments increased about 2.8 percent.

The historical difference in the levels of per-acre property taxes for these two regions of Illinois reflects the less productive soils in southern Illinois compared to other areas of the state. Less productivity results in lower assessed valuations for farmland. Generally, farm property tax rates are lower in southern Illinois as well. In 1993 these differences resulted in average per-acre taxes of $17.52 in northern and central Illinois and $7.52 in southern Illinois. Because the 1992 change in assessments was similar in the two parts of Illinois, the higher growth rate in per-acre taxes in the southern counties suggests a greater increase in tax rates there compared to northern and central counties.

Farm Property Taxes in Illinois and Other States

Figure 4 maps average per-acre farm property taxes for the 48 continental states and Hawaii for 1992. Published in 1994, the 1992 data are the most current available to compare the levels of farm property taxes between states. (The number given for Illinois in Figure 4 differs from Figure 1 because the source of the information used by the USDA differs from that used to compile Figure 1. The difference, however, is not significant. The USDA data samples all farms while the university data samples grain farms. Thus, there are more farm building taxes in the USDA data, resulting in the slightly higher per-acre payments.)

Per-acre property taxes on farmland are highest in the eastern states. Among midwestern states Illinois ranks third, behind Wisconsin and Michigan. Both of those states have "circuit breaker" programs for farm property taxpayers, where the state pays a portion of the tax bill, depending on the taxpayer's income. Accordingly, the figures for these two states are "gross" per-acre taxes, unadjusted for any part paid by the state. The "net" figures, or actual average per-acre farm property tax payments, are less than those shown on the map.

Excluding Wisconsin and Michigan, the highly urbanized eastern states, and Hawaii, Illinois has the highest average per-acre farm property tax payments in the U.S. ($15.18). A major factor determining the levels of property taxation in general and farm property taxation in particular is the dependence of local school systems on property tax revenue. Since Illinois depends rather heavily on the property tax to fund local schools, the state's relatively high per-acre farm tax level is not surprising. This dependence is a major issue in the debate on tax reform in Illinois.

Effective Tax Rates and Tax Payments

The *effective farm property tax rate*—the ratio of property taxes paid to the market value of farmland—is one of the better methods for measuring the property tax burden on Illinois farms. A high or an increasing effective rate indicates a high or an increasing property tax burden. Effective rates for the last 18 years for Illinois and the northern and southern regions of the state are shown in Table 1. The effective rate in 1993 for Illinois was 0.84, up from the 1991 rate of 0.82. The declining farm property tax burden that began in 1988 and continued through 1992 is now reversing itself. The growth in market values of farmland was outpaced by the growth in property tax payments in 1993, resulting in an increase in the Illinois farm property tax burden. The burden increased approximately 2.4 percent from 1992 to 1993. The underlying economic conditions in the farm economy coupled with higher farm property tax rates and farmland assessments suggest the burden will continue to increase for the next three or maybe four years. This will

Table 1. Effective property tax rates on Illinois farms, 1976 to 1993

	Effective tax rate (%)[a]		
Tax year	Northern Illinois	Southern Illinois	Illinois
1976	1.02	0.88	0.96
1977	0.93	0.75	0.86
1978	0.74	0.62	0.72
1979	0.72	0.59	0.68
1980	0.69	0.54	0.65
1981	0.60	0.49	0.56
1982	0.58	0.51	0.56
1983	0.66	0.56	0.64
1984	0.85	0.84	0.82
1985	0.99	0.84	0.95
1986	1.11	0.94	1.07
1987	1.31	0.92	1.20
1988	1.14	0.89	1.08
1989	1.02	0.82	0.97
1990	0.99	0.73	0.94
1991	0.94	0.71	0.89
1992	0.86	0.66	0.82
1993	0.88	0.68	0.84

[a]The effective tax rate is the ratio of property taxes to the market value of farmland, computed here using grain farms only.

not be the case if local taxing jurisdictions lower their rates, but such action would be inconsistent with their historical behavior.

Figure 5 shows indexes of average per-acre property tax payments as well as effective tax rates paid by Illinois grain farm owners. The index in per-acre tax payments shows the steady increase from 1976 through 1983, a decline from 1983 to 1987, an increase in 1988, roughly a steady state for 1989 and 1990, a decline in 1991 and 1992, and an increase in 1993. With higher assessments in 1992 and upward pressure on tax rates, the index of property taxes resumed its upward trend in 1993 (1977 = 100). The index of effective tax rates likewise increased in 1993. The tax burden represented by this measure approximately equals that experienced in 1985 and again in 1991 but falls below the record burden of 1987 (1987 index = 139.5; 1993 index = 97.7).

Summary

Average per-acre property tax payments on Illinois grain farms increased about four percent in 1993, reversing a five-year trend of steady or declining average per-acre taxes. Changes in tax rates combined with higher farmland assessments to push payments up. This reversal of the recent trend is expected to continue for taxes paid in 1994, 1995, and 1996; an expected average increase approaching 10 percent during these years will push 1996 average per-acre farmland taxes close to $20. Historical highs in per-acre average payments are expected to be set in each of the next three years unless there is a relaxation of property tax rates, particularly school rates.

Comparisons of the effective tax rates and the average per-acre tax payments indicate an increase in farmland tax burden in 1993. As with per-acre payments, the burden will increase at least through 1996 or 1997 unless there are changes in Illinois tax policies. Heavy reliance on property taxes to fund schools will continue to keep per-acre farm property taxes in Illinois among the highest in the U.S. among states with significant agricultural sectors.

Understanding the dynamics of the Illinois farm property tax is not a trivial undertaking. Future increases in the farm property tax burden, which began to rise again in 1993, will intensify pressures from the agricultural sector for reform. These demands will likely be manifested in ever-louder calls for less dependence on the property tax to finance schools and an increased financial role for state government. A sledgehammer policy of statewide property tax caps, already in place in the five collar counties surrounding Cook County, will gain popular support downstate in the absence of consensus alternatives for state tax policy. Shifting local school funding to state government to any great extent is out of the question without increases in one or both of the state's major revenue sources—sales tax and income tax.

Balancing the Illinois tax system presents a significant challenge to the state's General

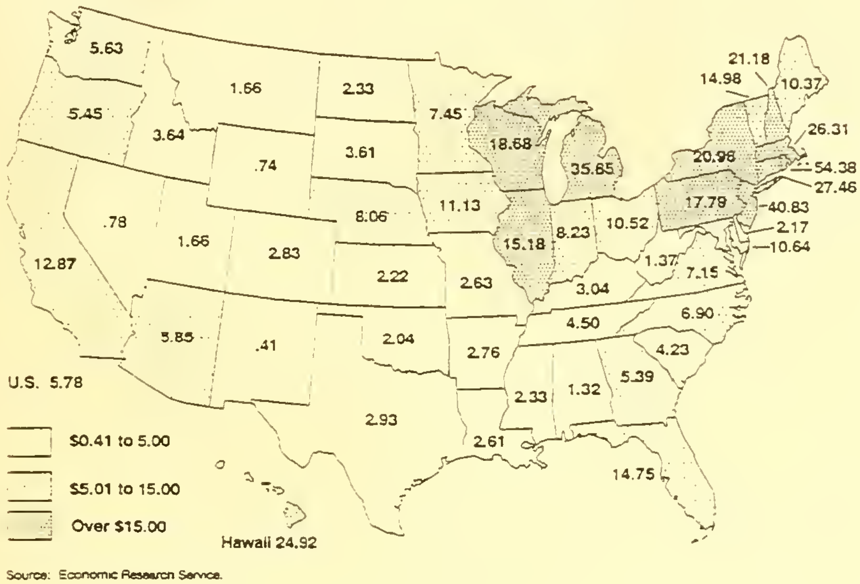

Figure 4. Average per-acre agricultural real estate taxes, 1992.

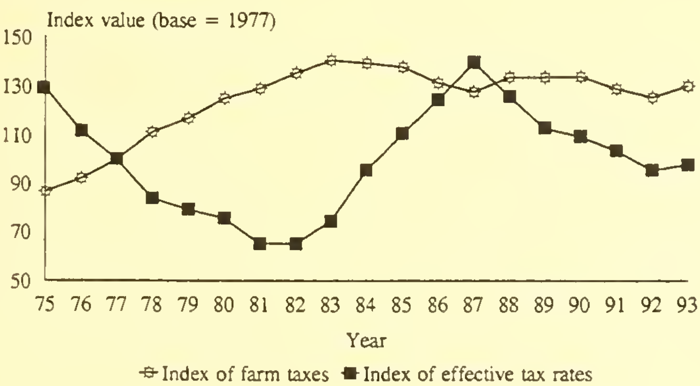

Figure 5. Indexes of per-acre farm property taxes and effective farm property tax rates, 1975 to 1993.

Assembly and governor. However, understanding the complexities and dynamics of the farm property tax system will yield significant dividends as current tax policies are assessed and alternatives considered. The task of state tax reform is formidable, but the benefits of a more balanced Illinois state and local tax system will be significant and long lasting.

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Issue 95-4 *April 1995*

Grain Marketing Tools: A Survey of Grain Elevators

In July of 1994, 887 Illinois grain dealers were surveyed to find out what grain marketing tools and services they make available to producers and to learn to what extent farmers use them. The Department of Agricultural Economics of the University of Illinois at Urbana-Champaign and the Illinois Cooperative Extension Service, in cooperation with the Grain and Feed Association of Illinois, conducted the survey.

Results

Two hundred usable questionnaires were returned, for a 22.5 percent response rate. Country elevators or satellites provided 89.5 percent of responses, and terminal elevators the remaining 10.5 percent. The average storage capacity for all responding elevators was 2,163,545 bushels, with a range from zero to 14 million bushels. The average customer base was 352 grain producers, with a range from two to 2,500. It was assumed that some grain producers used multiple marketing outlets, and there was no attempt to remove duplicate responses.

Two facilities handled canola, representing about 1 percent of their total volume of business; 99 percent of facilities handled corn (67.6 percent of business); 33 percent handled oats (3 percent of business); 98.5 percent handled soybeans (27 percent of business); 82.3 percent handled wheat (5 percent of business); and 11.6 percent handled grain sorghum (7 percent of business). Table 1 summarizes statewide information.

Distribution of Responses

Six regions were defined for this survey, corresponding to the areas covered by six Extension educators in farm business management and marketing. About a third of the responses came from the east-central region, where most Illinois grain is produced. Ten percent of the respondents did not identify their locations. The response distribution is summarized in Table 2.

Grain Marketing Tools

The survey inquired about the availability of eight marketing tools (see Table 3 for definitions of the contract types). Five tools offered by elevators predominated: forward cash contracts, delayed pricing contracts, basis contracts, minimum price contracts, and hedge-to-arrive contracts. Three additional tools were available on a limited basis. The survey ascertained the following statistics:

- Most all facilities (98 percent) surveyed offered forward cash contracts. More than half (56.6 percent) of the elevators' customers used this marketing tool, representing 43.3 percent of elevator purchases.
- Delayed pricing contracts were offered by 94 percent of elevators. Almost 32 percent of grain producers used these contracts (22.5 percent of purchases).

Table 1. Commodities Handled and Volume of Business for Illinois Grain Elevators and Terminals

Commodity	No. of facilities handling	% of facilities handling	% of total volume
Corn	198	99	67.6
Soybeans	197	98.5	26.8
Grain sorghum	23	11.6	6.7
Oats	65	32.7	2.9
Wheat	163	82.3	5.3
Canola	2	1	1

Table 2. Distribution of Responses by Region

Region	Number responding	Valid %	Cumulative %
0 (no location given)	19	9.7	9.7
1 (northwest)	18	9.2	18.9
2 (northeast)	37	18.9	37.8
3 (west-central)	23	11.7	49.5
4 (east-central)	65	33.2	82.7
5 (south-central)	21	10.7	93.4
6 (south)	13	6.6	100
Other (respondents for which data are missing)	4		

Table 3. Grain Marketing Tools Defined

Forward cash contract: An agreement that establishes price, location of delivery, and time of delivery for grain to be delivered at a later date. The contract may be made before harvest.

Delayed price contract: An agreement that transfers the title to grain to the buyer at the time of delivery but does not establish price. The date of pricing is at the option of the seller, within the period agreed to in the contract. A delayed price contract fixes the schedule of service charges and allows the seller to speculate on the cash price.

Basis contract: An agreement establishing that the price paid for grain to the seller will be the price of a specified futures contract on the day of the seller's choosing, minus the basis that existed at the time of the contract. A basis contract fixes the basis and allows the seller to speculate on the futures price.

Minimum price contract: An agreement in which the buyer establishes a minimum price by buying put options on a quantity of grain. Minimum price is offered to a seller through a cash contract. If prices go up, the option is allowed to expire, and the buyer pays the seller a higher price. If prices go down, the buyer pays the minimum price agreed to in the contract and offsets losses by cashing in on the higher premium for the put option.

In a second type of minimum price contract, the buyer buys a call option and contracts a sale using the current price with a seller. If prices go up, the buyer cashes in on the higher premium for the call option and passes the higher price on to the seller. If prices go down, the option is allowed to expire, and the minimum price is paid to the seller as agreed to in the contract.

Hedge-to-arrive contract (also known as futures-only contract): An agreement specifying the time of delivery for grain and the futures price on which the seller's price will be based. The futures price, established at the time of the contract, is the current price of the appropriate futures contract. The seller then chooses the date, before expiration of the contract, on which to establish the basis portion of the price. A hedge-to-arrive contract allows the seller to speculate on basis improvement without trading in the futures market directly.

Cash contract with buy-back: A variation of the forward cash contract in which the seller locks in a cash price for later delivery but has the right to buy back the contract if prices decline. The time of the contract establishes the initial price. If a buy-back occurs, the gain to the seller is added to a later sale to that buyer. The buyer sells futures contracts at the time of the initial contract. If prices decline, the buyer buys the futures and passes the profit back to the producer.

Premium offer contract: A variation of the forward cash contract in which the buyer pays a premium for grain sold contingent upon the seller's making a firm offer of an equal number of bushels at a specific (higher) futures price. If the futures reach that price, the seller automatically sells the grain, using the basis that day for the appropriate shipment period. The seller makes no additional sales if the futures fail to reach that price. The buyer sells call options at the strike price equal to the offer price of the seller. The amount of the premium on the option determines the premium to the seller for the initial sale.

Multiple-year contract: A variation of the forward cash contract in which the seller is allowed to change the time of delivery, even into the next marketing year. The time of the contract establishes the initial price, and the buyer hedges by selling futures contracts. If the seller changes the time of delivery, the elevator moves the hedge to a later contract and adjusts the price to the seller by the amount of the premium or the discount incurred in rolling the hedge.

- Basis contracts were offered by 87 percent of the elevators. Eight percent of grain producers used basis contracts (6.5 percent of purchases).
- Minimum price contracts were offered by 72 percent of elevators. Almost 8 percent of producers used minimum price contracts (4 percent of purchases).
- Hedge-to-arrive contracts were offered by 68.7 percent of elevators and used by 7 percent of grain producers (about 5 percent of purchases).
- Cash contracts with buy-back options were offered by one of every three elevators (32 percent). Seventeen percent of grain producers used these contracts (18 percent of purchases).
- Premium offer contracts were offered by one of every four elevators (27 percent) and used by 8 percent of grain producers (9.4 percent of purchases).
- Multiple-year contracts were offered by 16.7 percent of elevators and used by 3 percent of grain producers (2 percent of purchases).
- In the category "other," 11 percent of elevators said they offered additional marketing tools, mostly straight cash transactions.

Twenty-nine percent of grain producers used straight cash marketing (29 percent of purchases).

Regional Results

Regional differences in the types of marketing tools offered to grain producers were small. Elevators in the east-central region offered premium offer contracts to their customers slightly more frequently than did elevators in the other regions. Elevators in the northwest, northeast, and south-central regions offered hedge-to-arrive contracts slightly more frequently than did elevators in the other three regions.

Grain producers in all regions favored forward cash and delayed pricing contracts, but there were some regional differences. In a typical year, grain producers in the northwest, west-central, east-central, and south-central regions were more likely to use forward cash contracts, while grain producers in the south favored delayed pricing arrangements. Grain producers in the south were also more inclined to use basis contracts than users in other regions of the state. South-central grain producers were slightly more inclined to use hedge-to-arrive contracts than users in other state regions.

Table 4 summarizes, by region, the types of marketing tools offered through local elevators and the percentage of producers (customers) who used each tool in a typical grain marketing year.

Summary

In July of 1994, 200 Illinois grain elevators and terminals responded to a survey on grain marketing tools sponsored by the Department of Agricultural Economics of the University of Illinois at Urbana-Champaign, the Illinois Cooperative Extension Service, and the Grain and Feed Association of Illinois. The survey was conducted to learn what marketing tools are available to grain producers through local elevators and how much the tools are used.

Elevators were asked if they offer any of eight grain marketing tools. The five predominant tools offered were found to be forward cash contracts, delayed price contracts, basis contracts, minimum price contracts, and hedge-to-arrive contracts. To a lesser extent elevators offered premium offer contracts, multiple-year contracts, and cash contracts with buy-back options.

Grain producers statewide favored forward cash contracts and delayed price contracts.

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Issued by:

Harold Guither

Table 4. Survey Responses: Elevator Demographics and Grain Marketing Tools Offered and Used

	Region[a]							
	NW	NE	WC	EC	SC	South	None	State
Elevators								
Average customer base	199	310	452	316	464	450	398	352
Average storage (million bushels)	2.3	2.14	2.1	2.52	2.31	0.99	1.58	2.16
No. of responses	18	37	23	65	21	13	23[b]	200
Grain marketing tools								
Basis contract								
Offered[c]	94	84	81.8	87.7	85.7	84.6	89.5	86.9
Used[d]	6.9	6.9	6.2	7.6	9.1	13.3	7.5	8
Cash contract with buy-back								
Offered	29	30	30.4	35.4	28.6	30.8	33.3	31.8
Used	3.3	6.1	4	19.3	29.3	7.3	39	16.9
Delayed pricing contract								
Offered	88	97	100	92.3	100	84.6	94.7	94
Used	19	29	20.1	35.4	29.1	52.7	37	31.6
Forward cash contract								
Offered	94	100	100	98.5	95	92.3	100	98
Used	71	63	64.2	52.8	52.6	35.4	55.8	56.6
Hedge-to-arrive contract								
Offered	88	76	60.9	61.5	75	61.5	68.4	68.7
Used	4.8	10	1.9	5.5	14.1	7.1	2.4	6.8
Multiple-year contract								
Offered	77	76	68.2	76.9	60	69.2	73.7	72.1
Used	7.7	7.3	6.1	8.5	3.1	4.3	12.5	7.6
Minimum price contract								
Offered	24	14	13	21.5	0	23.1	22.2	16.7
Used	2.8	0.3	0.5	6.3	0	2	0.05	3.2
Premium offer contract								
Offered	24	35	13	40	19	7.7	16.7	27.3
Used	8	6.9	1	11.2	1	10	3	7.9
Other (cash sales)								
Offered	5.9	11	13	9.2	14.3	15.4	16.7	11.1
Used	2	53	14.7	31.7	15	30	34.3	28.8

[a]NW, northwest; NE, northeast; WC, west-central; EC, east-central; SC, south-central.
[b]19 gave no locations; 4 had data missing.
[c]Entries for "offered" record the percentage of elevators that offered the tool.
[d]Entries for "used" record the percentage of sellers that used the tool.

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Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 95-5 *May 1995*

Illinois Farm Machinery Cost Estimates for 1995–96

The cost estimates provided are designed to help establish reimbursement or rental rates for farm machinery. The figures, determined using economic–engineering formulas, represent best estimates of the typical costs for owning and operating specific pieces of field equipment.

Many costs have increased from those published in October 1993. Increases are due to the selection of larger equipment and to higher equipment prices, interest rates, fuel prices, and repair costs.

The types of costs associated with machinery are ownership and operating. The total cost for using a machine is the sum of the two.

Ownership costs

Costs for owning machinery, incurred whether or not the machine is used, include depreciation, interest, insurance, and housing. The methods we describe were used to compute each category. The total ownership cost cited for each machine is the sum of the four cost categories.

As machines age, they continually lose value. This decreased value, or depreciation, is also influenced by wear and obsolescence. The current value of each machine was determined using the "remaining farm value" formulas in the *1994 Standards of the American Society of Agricultural Engineers* (ASEE). Depreciation costs were calculated by subtracting the remaining farm value after ten years of assumed ownership from the purchase price. Depreciation for a specific machine is thus a fixed amount over the ten years. However, the depreciation cost per hour or per acre varies with how much the machine is used.

The interest charge represents the cost of financing the machine or the opportunity cost of dollars invested in a machine. Interest was calculated by multiplying the current real interest rate (6.5 percent) by the remaining value of the machine.

Storing machines in a shelter has been shown to increase machinery life and resale value. The charge is 1 percent of the remaining farm value of the machine.

The charge for insurance is 0.5 percent of the remaining farm value of the machine.

Operating costs

Operating costs, those that occur when a machine is used, include fuel, lubrication and filters, maintenance and repair, and labor.

Fuel cost was calculated by multiplying the price of fuel (at $1 per gallon for diesel) by consumption, estimated using a formula in the 1994 ASEE standards.

Lubrication costs, including filters, were assumed to equal 15 percent of fuel cost. Expenses for repair and maintenance include replacement parts, materials, shop expenses, and labor for keeping a machine in good working condition. Repair costs vary greatly. Repair and maintenance costs were estimated using a formula published in the 1994 ASEE standards. The formula is based on actual surveys of repair costs of farm machines and on estimates provided by engineers. Over the last several years, the repair cost coefficients used in the formula have decreased, lowering the estimated costs of repairs and maintenance.

Labor is assumed to cost $10 an hour. Labor time is assumed to be 10 percent greater than actual machine time to provide for travel, in-field lubrication, refueling, and so on.

Cost for various operations

Annual use of farm equipment has decreased in recent years. In the early 1970s, average annual tractor use was 400 to 500 hours. With the adoption of conservation tillage and tremendous increases in equipment size, annual use has decreased significantly even though farm size has increased. As annual equipment use decreases, the cost per acre or per hour of use increases and should be reflected in rental rates. Table 1 includes estimated costs for different hours of annual use.

For tractors, high use has been set at 500 hours a year, medium use at 300 hours, and low use at 100 hours. Tillage and related equipment is assumed to be used 25 percent of tractor hours and planting and related equipment 20 percent of tractor hours.

Other assumptions include these:

- Purchase price = 90 percent of list price
- Diesel fuel cost = $1 per gallon
- Real interest rate = 6.5 percent
- Housing and insurance cost = 2 percent of remaining farm value
- Labor cost = $10 per hour
- Labor time = 110 percent of tractor time

Tractor costs

Costs for tractors, shown in Table 2, include estimated ownership, repair and maintenance, insurance, and shelter. The costs do not include fuel and labor.

Harvesting costs

The costs for harvesting equipment (Table 3) are calculated assuming the combine is used 250 hours a year—150 for corn and 100 for soybeans and small grains. The useful life of the machine is calculated to be ten years. Those with smaller operations should see Table 4, with estimates for 175 hours a year.

It costs more per acre to harvest corn with a smaller combine because of a higher price per unit of width and a higher labor cost per acre. For larger combines, harvesting capacity goes up faster than the price of the machine.

The cost estimates in Tables 3 and 4 do not include any expenses or extended delays associated with hauling grain from the combine.

Custom rates

The costs of operating farm equipment have increased during recent years. Farm operators have replaced equipment with new and often larger pieces. Inflation, the anticipated increase in fuel costs, and the ripple effect of both through the economy, in addition to anticipated increases in interest rates, will probably continue to drive costs up.

The numbers in Table 1 are estimates of actual costs, both ownership (fixed) and operating (variable). They do not include any allowance for operator "profit" or any payment for management or risk. Many operators suggest a profit allowance of 10 to 15 percent.

These costs serve as a starting point for negotiating a "custom operating rate." Neighborhood rates may or may not cover all these costs. In some cases, the prevailing custom rate may be higher than what is listed in these tables.

It should be noted that most farmers charge less than is needed to recover all their overhead (fixed) costs. If farmers do not charge enough to cover all costs, their custom work will not break even. Remember, custom rate and actual cost for an operation may be different.

A more detailed breakdown of costs, cost determination data, and alternative cost determination data is available in Extension unit offices as *Appendix to Illinois Farm Machinery Cost Estimates for 1995–1996.*

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Table 1. Costs for Field Operations (Including Power Unit, Implement, and Labor)

	Unit	Medium use	High use	Low use
Tillage equipment				
Moldboard plow	$/acre	17.50	14.00	38.50
Chisel plow	$/acre	9.00	7.00	19.00
Disk	$/acre	6.75	5.50	15.50
Field cultivator	$/acre	5.00	4.00	11.00
Subsoiler	$/acre	9.50	7.50	20.00
Paraplow	$/acre	11.00	9.00	24.00
Combination tillage tool	$/acre	9.00	7.00	19.00
Chemical application equipment				
Anhydrous application	$/acre	5.00	4.00	11.00
Spraying	$/acre	2.00	1.75	5.00
Self-propelled sprayer	$/acre	2.50	1.75	5.00
Planting and cultivation equipment				
No-till drill	$/acre	10.50	8.00	24.00
Conventional drill	$/acre	13.00	10.50	25.00
Planter	$/acre	7.25	5.50	16.00
No-till planter	$/acre	9.00	6.75	21.00
Cultivator	$/acre	5.00	4.00	11.25
Rotary hoe	$/acre	2.25	1.75	5.00
Equipment for other activities				
Stalk shredder	$/acre	8.00	6.75	18.00
Manure spreader[a]	$/hour	60.00	—	—
Grain harvesting				
Combining corn	$/acre	27.00	—	30.00
Combining small grain	$/acre	21.50	—	25.00
Combining soybeans	$/acre	21.50	—	25.00
Drying grain[b]	¢/point	.25 to 1		
Grain cart	¢/bushel	1		
Hauling grain (one way)[b]	¢/bushel/mile	1.5		
Storing grain[b]	¢/bushel/month	2	—	—
Forage harvesting equipment				
Grass forage harvester	$/acre	52.00	40.00	130.00
	$/ton	4.50	3.50	10.75
	$/machine hour	95.00	70.00	240.00
Row crop harvester	$/acre	57.00	40.00	140.00
	$/ton	2.85	2.00	7.00
	$/machine hour	103.00	75.00	240.00
Forage blower[b]	$/hour	30.00		
Disk hay mower	$/acre	17.00	13.00	37.00
Sickle bar mower	$/acre	12.00	9.50	14.50
Mower/conditioner	$/acre	9.75	7.25	21.50
Hay rake	$/acre	8.50	7.25	20.00
Hay baler, small square (200 bales/hour)	¢/bale	40		

Table 1. (con't) Costs for Field Operations (Including Power Unit, Implement, and Labor)

	Unit	Medium use	High use	Low use
Hay baler, 1,000-lb round (10 bales/ hour)	$/bale	7.00		
Hay baler, 2000-lb round (8 bales/hour)	$/bale	10.00		
Hay baler, big square (2,000-lb bale)	$/bale	16.00		
General mowing, rotary mower	$/acre	15.00	12.00	30.00
	$/hour	51.00	41.00	105.00
Liquid manure, knife-in (300- to 350,000-gallon minimum, less than 2 miles)	¢/gallon	0.5		

Note: Figures do not include profit or a charge for risk. Operators should act accordingly in setting their custom rates.

[a]125-hp tractor, 350-bushel spreader, 20-foot swath.

[b]Taken from *1994 Iowa Farm Custom Rate Survey.*

Table 2. Cost of Owning and Operating Field Tractors (Excluding Fuel and Labor)

	100 hours ($/hour)	300 hours ($/hour)	500 hours ($/hour)	Price ($)
66 PTO HP tractor	37.20	13.10	8.70	36,700
85 PTO HP tractor	42.50	15.00	9.90	42,000
100 PTO HP tractor	51.10	18.00	11.90	50,400
110 PTO HP tractor	59.50	20.90	13.90	58,700
125 PTO HP tractor	66.70	23.50	15.60	65,800
145 PTO HP tractor	71.70	25.10	16.70	70,400
160 PTO HP tractor	81.10	28.50	19.00	80,000
180 PTO HP tractor	90.50	31.90	20.20	89,300
200 PTO HP tractor, 2WD	99.40	35.00	23.30	98,100
225 PTO HP tractor, 2WD	121.80	42.90	28.50	120,200
250 PTO HP tractor, 4WD	94.40	33.20	22.10	93,100
300 PTO HP tractor, 4WD	116.60	41.00	27.30	115,000
325 PTO HP tractor, tracked	177.40	62.50	41.50	175,000
350 PTO HP tractor, 4WD	128.20	45.10	30.00	126,500
400 PTO HP tractor, 4WD	146.20	51.50	34.20	144,200

Table 3. Cost of Owning and Operating Harvesting Equipment at High Use (250 Hours a Year)

Equipment	Total cost ($/acre)	Attach- ment unit	Labor cost per acre ($)	Total cost ($/hour)	Capacity (A/year)	Annual (A/year)	List price ($)
140-hp combine[a]				44.30			82,000
4-row corn head	33.02	5.22	4.65	78.05	2.40	354	15,900
18-foot grain platform	18.91	3.47	2.45	80.45	4.30	425	13,300
185-hp combine				57.91			107,200
6-row corn head	28.31	5.01	3.10	100.44	3.50	532	22,900
20-foot grain platform	21.02	3.54	2.33	99.41	4.70	473	15,100
215-hp combine				67.26			124,500
8-row corn head	24.81	4.89	2.33	117.37	4.70	709	29,800
22-foot grain platform	21.52	3.41	2.12	111.98	5.20	520	16,000
260-hp combine				75.88			140,400
12 row corn head	20.05	5.09	1.55	142.27	7.10	1,050	46,500
30-foot grain platform	18.00	3.03	1.55	127.68	7.10	1,050	19,400

Note: All costs figured at 65% field efficiency, 3 mph, 250 hours per year on power unit, 150 hours on corn head, 100 on grain platform.

[a]1993 price for 140-hp combine; not available in 1995.

Table 4. Cost of Owning and Operating Harvesting Equipment at Light Use (174 Hours a Year)

Equipment	Total cost ($/acre)	Attach- ment unit	Labor cost per acre ($)	Total cost ($/hour)	Capacity (A/year)	Annual (A/year)	List price ($)
140-hp combine[a]				56.28			82,000
4-row corn head	40.00	7.13	4.65	94.56	2.36	248	15,900
18-foot grain platform	23.11	4.85	2.59	98.34	4.25	297	13,300
185-hp combine				73.58			107,200
6-row corn head	34.58	6.85	3.10	122.61	3.58	372	22,900
20-foot grain platform	25.76	7.96	2.33	121.77	4.73	330	15,100
215-hp combine				84.45			124,500
8-row corn head	30.47	6.68	2.33	144.02	4.73	496	29,800
22-foot grain platform	26.40	4.78	2.12	137.28	5.20	364	16,000
260-hp combine				93.37			140,400
12-row corn head	24.82	6.95	1.55	175.98	7.09	745	46,500
30-foot grain platform	22.11	4.25	1.55	156.81	7.09	496	19,400

Note: All costs figured at 65% field efficiency, 3 mph, 175 hours per year on power unit (105 hours for corn head, 70 hours for grain platform).

[a]1993 price for 140-horsepower combine; not available in 1995.

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Costs of Growing Corn and Soybeans in 1994

In 1994 the economic costs per acre for growing corn in Illinois averaged $368 in the northern section, $384 in the central section with higher soil ratings ("central high"), $349 in the central section with lower soil ratings ("central low"), and $297 in the southern section. Soybean costs per acre were $299, $312, $279, and $239 for the same sections, respectively (see Table 1). Costs were lower in the southern section primarily because land prices are lower there. Costs per bushel ranged in the state from $2.08 to $2.25 for corn and from $5.56 to $6.00 for soybeans. Variations in these costs were related to weather factors, yields, and land quality.

These figures were obtained from business records kept by farmers enrolled in the Illinois Farm Business Farm Management Association. The samples included only farms without livestock and with more than 260 acres of productive and nearly level soils in each area of the state. As illustrated in Figure 1, farms located in 22 counties north and northwest of the Illinois River make up the sample for northern Illinois. Farms from 36 counties below a line from about Mattoon to Alton are the sample for southern Illinois, and the remaining 44 counties make up the sample for central Illinois. The sample farms averaged 772 tillable acres in northern Illinois, 852 acres in the central-high section, 849 acres in the central-low section, and 1,059 acres in southern Illinois.

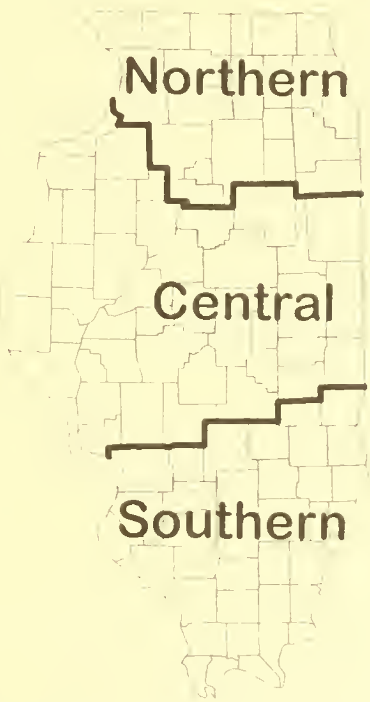

Figure 1. Geographical distributions of farms in this study.

This economic analysis includes factors in the cost of doing business that nonagricultural businesses may not have, such as the charge for labor performed by the farm operator, a rental charge for the use of owned and rented land, and interest on equity in machinery and inventories of grain and livestock. These factors cannot be used as expense items on income tax returns. In the short run, farm operators may continue to produce without covering these total economic costs. However, if this situation persists over the long run, it will be difficult to maintain the same level of resources in the farm firm. In addition, producers will be challenged to lower the cost of production, increase volume, or do both as profit margins remain narrow.

Table 1. Costs Per Acre to Grow Corn and Soybeans on Illinois Grain Farms Without Livestock in 1994

	Corn				Soybeans			
	North	Central high[1]	Central low[2]	South	North	Central high[1]	Central low[2]	South
Farms	351	630	306	235	351	630	306	235
Acres in crop	430	435	425	482	312	403	385	460
Nonland costs ($)								
Variable costs								
Soil fertility	50	53	53	54	16	17	17	19
Pesticides	29	28	27	25	31	29	29	28
Seed	26	26	25	22	13	14	13	14
Drying and storage	12	15	12	5	4	6	5	2
Repairs, fuel, and hire	30	27	27	32	25	23	23	28
Total variable costs	147	149	144	138	89	89	87	91
Percent change from 1993	1	3	4	(1)	2	0	0	0
Other								
Labor	30	31	30	30	29	29	27	28
Buildings and storage	9	6	7	5	6	4	4	2
Machinery depreciation	27	29	24	27	22	24	20	22
Nonland interest	20	20	18	14	18	18	16	13
Overhead	15	14	15	11	15	13	14	11
Total, other costs	101	100	94	87	90	88	81	76
Total, nonland costs	248	249	238	225	179	177	168	167
Percent change from 1993	2	2	3	(1)	3	0	1	(2)
Land costs ($)								
Taxes	18	21	16	8	18	21	16	8
Annually adjusted net rent	102	114	95	64	102	114	95	64
Total land cost	120	135	111	72	120	135	111	72
Total, all costs	368	384	349	297	299	312	279	239
Percent change from 1993	4	5	4	1	5	4	3	1
1994 yields, bushels per acre	177	182	165	132	53	52	50	43
Nonland cost per bushel ($)	1.40	1.37	1.44	1.70	3.38	3.40	3.36	3.88
Total costs per bushel ($)	2.08	2.11	2.12	2.25	5.64	6.00	5.58	5.56
1991–1994 average yield, bushels per acre	141	160	138	128	47	49	44	41
Nonland cost per bushel ($)	1.76	1.56	1.72	1.76	3.81	3.61	3.82	4.07
Total costs per bushel ($)	2.61	2.40	2.53	2.32	6.36	6.37	6.34	5.83

Note: The entries shown below the line are costs based on 1991–1994 average yields.

[1]Soil productivity ratings of 86 to 100.

[2]Soil productivity ratings of 56 to 85.

Nonland costs

Soil fertility costs for soybeans were allocated on the basis of phosphorus, potassium, and lime removal, with the residual cost allocated to corn. The seed, crop, pesticide, and drying expenses also included some commercial drying and storage and the estimated value of home-raised seed. The costs of fuel, machine hire, and machinery repair were reduced for income received from custom work. Labor costs included the cash value of hired labor plus a charge for available unpaid labor at a rate of $1,675 per month. This rate represents a charge for only the physical labor input, not for management. Building and storage costs were for repairs and depreciation only.

The nonland interest rate in 1994 was set at 7 percent; this figure was then multiplied by the sum of half the average inventory value of crops at the beginning and the end of the year, the depreciated value of machinery and buildings, and half the total operating expenses. The result is the total nonland interest charge. Overhead costs included insurance, utilities, the farm share of light vehicle expenses, and miscellaneous items. Though no charge has been made for management, it may normally be about 7 percent of the total cost per bushel (15 to 20 cents for corn and 35 to 40 cents for soybeans).

Land costs

Land costs included the adjusted net rent and the real estate taxes. Net rent was represented as the average rent received by crop-share landlords on record-keeping farms for the period 1990 to 1993. Be cautious when interpreting differences in land costs between areas. In the long run, the net rent residual return to landowners should tend to equalize the total cost of production.

Cost per bushel

Record-breaking high yields in 1994 decreased production costs per bushel of corn for northern and central Illinois. Costs per bushel remained level (increasing by just 1 cent) for southern Illinois between the two years. The decreases in costs per bushel ranged from 69 cents in northern Illinois to 31 cents in central-high Illinois. The average 1994 corn yield was higher than in 1993 by 49 bushels in northern Illinois, by 1 bushel in southern Illinois, and by 33 bushels in central-low Illinois. The regional average corn yields for 1994 were 4 to 36 bushels per acre above the four-year averages from 1991 through 1994. Although costs per bushel decreased in most areas, costs per acre increased in every area. All regions incurred higher costs for fertilizer, pesticide, and land. Land increased the most, related to increased returns to land the past few years and a resulting increase in land values. Selected other costs, such as machinery depreciation and the nonland interest charge, increased in certain areas of the state.

Production costs per bushel of soybeans in 1994 also decreased from 1993 as a result of higher yields, in this case for all areas of the state. Yields per acre ranged from a 6-bushel increase in northern Illinois to a 2-bushel increase in southern Illinois. The decreases in costs per bushel ranged from 12 cents in the central-high section to 44 cents in central-low. Total costs per acre increased in all areas of the state, ranging from $3 in southern Illinois to $14 in northern Illinois. The cost increases for soybeans followed the same basic pattern as those for corn. Regional average soybean yields were 2 to 6 bushels per acre higher in 1994 than the four-year averages from 1991 through 1994.

Costs per acre

The statewide average for 1994 total costs of $359 per acre to produce corn reflected an increase of 4 percent since 1993 and the highest level since 1984. Most of the increase was due to higher prices for fertilizer, pesticides, and land. These costs had declined from 1985 through 1992 from $356 to $320 per acre (see Figure 2). Most of the decrease was in machinery depreciation and interest charges, cash costs such as fertilizer, pesticide, and seed declined very little. Cash costs of $145 per acre in 1994 were the highest since at least 1981. These costs were as low as $130 per acre in 1981 and 1989. The 1994 land cost of $117 per acre was higher than it has been since at least 1981.

The statewide average total costs per acre to produce soybeans also increased, from $281 in 1993 to $290 in 1994 (see Figure 3). These

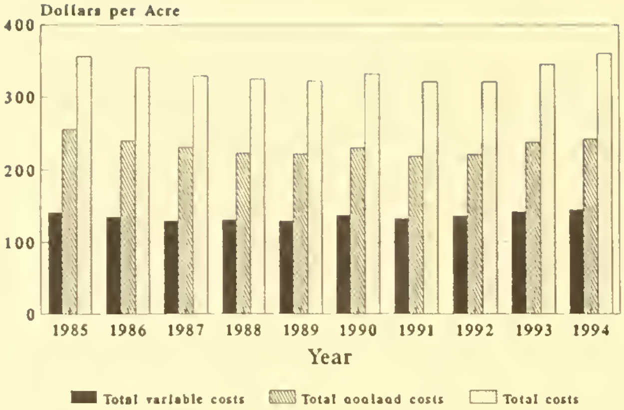

Figure 2. Total costs per acre to grow corn on Illinois grain farms.

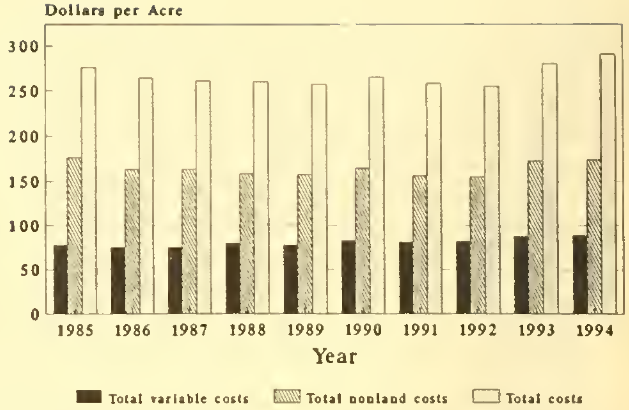

Figure 3. Total costs per acre to grow soybeans on Illinois grain farms.

costs were at the highest level since 1983, when they were $296 per acre. The same expenses that increased for corn also increased for soybeans. Variable costs of $89 per acre were the highest since at least 1981. Pesticide costs have increased from $16 to $29 per acre during this time span. After an extended period of moderately declining per-acre costs during the early and mid-1980s, total costs increased significantly in 1993 and increased another 3 percent in 1994. Some of the increases can be explained by improved farm earnings, which resulted in higher land values and higher land costs. Time will tell whether we have started an extended period of rising costs or if the increase in costs in 1993 and 1994 is a short-term phenomenon.

Cost comparisons

Average variable costs per bushel of corn for the five years from 1990 through 1994 ranged from 90 cents in the central-high Illinois to $1.06 in southern Illinois (see Table 2). Total costs per bushel ranged from $2.24 in southern Illinois to $2.50 in northern Illinois. Total costs per bushel were lower in southern Illinois due to lower land prices.

Average variable costs per bushel of soybeans ranged from $1.73 in the central-high section to $2.15 in southern Illinois. Total costs per bushel varied from $5.58 in southern Illinois to $5.96 in northern Illinois. Like 1994 corn, the total cost per bushel for soybeans was lower in southern Illinois due to lower land prices.

Table 2. Comparison of the Average Costs of Producing Corn and Soybeans, 1990 Through 1994

	Corn				Soybeans			
	North	Central high[1]	Central low[2]	South	North	Central high[1]	Central low[2]	South
Soil productivity rating	83	93	77	60	83	93	77	60
Yield per acre	140	158	138	124	47	49	44	40
Variable cost per acre ($)	144	142	135	132	84	85	81	86
Total costs per acre ($)	350	357	323	278	280	289	258	223
Variable cost per bushel ($)	1.03	0.90	0.98	1.06	1.79	1.73	1.84	2.15
Total costs per bushel ($)	2.50	2.26	2.34	2.24	5.96	5.90	5.86	5.58

[1]Soil productivity ratings of 86 to 100.

[2]Soil productivity ratings of 56 to 85.

Break-even requirements

Using the average yield for the past four years, current selling prices for corn are below the average total 1994 cost of production in northern Illinois, near the total cost in central Illinois, and above the total cost in southern Illinois. In every region, current selling prices for soybeans are below the total costs of production using 1991 through 1994 average yields. An owner-operator with average yields for 1991 to 1994 would need 93 cents to $1.08 per bushel for corn and $1.82 to $2.22 per bushel for soybeans to recover the variable costs listed in Table 1. Recovering total costs would require receiving $2.32 to $2.61 a bushel for corn and $5.83 to $6.37 a bushel for soybeans. Individual tenants and landowners computing the average break-even cost per bushel for growing corn and soybeans should divide the costs and yields shown in the table as they are shared by the terms of the lease.

Impact on farmland values

Farmland values generally are related to grain prices and the nonland costs of production because under traditional crop-share leases, income left after other costs have been deducted is considered the return to land. Even with fixed cash-rent leases, grain prices and nonland costs of production will bear on what farm operators will be willing to pay to cash rent land, which in turn affects farmland values. Values for Illinois farmland have increased by about 40 percent since 1987, after having declined by almost 50 percent between 1979 and 1987. The increase in land values was due in part to improved farm earnings and a return to farmland that was more competitive with alternative nonfarm investments. For many areas of the state, farm earnings for 1994 were moderately lower than in 1993. Earnings in southern Illinois and on hog and cattle farms were significantly lower in 1994 than in 1993. Earnings in the northern area of the state were higher. Record-high yields were offset by lower prices and higher costs.

Overall, the financial side of the agricultural sector has been improving during the last five years compared to the early and mid-1980s. However, incomes have varied considerably due to variations in crop yields and types of enterprises. Farm operators will need to continue monitoring their financial conditions closely and avoid excessive levels of borrowed capital to finance their businesses. They should also avoid purchasing machinery solely to reduce income taxes due. Large capital purchases should rather fit into the long-term plan of operations. Risk management will be more important to farm operators as profit margins narrow and crop yields seem more variable due to fluctuating weather conditions.

To remain competitive, farm operators must continue to monitor and control costs, use borrowed capital wisely, reduce risk when possible, and adopt new technologies that will economically increase the productivity of the farm business.

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Cooperative Extension Service

FARM ECONOMICS
Facts & Opinions

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The Financial Position of Illinois Farm Operators: Costs and Returns from Crop and Livestock Enterprises

This report, based on summaries of Illinois farm business records, reviews the financial status of Illinois farm operators. Farm operator labor and management earnings decreased moderately in 1994 compared to the good earnings experienced in 1993 (Figure 1).

Record-high corn and soybean yields were offset by lower grain prices, higher costs, and significant drops in earnings on hog and beef farms. The average corn yield for all farms in the study was 163 bushels per acre, compared to 132 in 1993. The 1994 yield was 10 bushels per acre higher than the previous record yield, in 1992, of 153 bushels. Soybean yields of 50 bushels per acre were 4 bushels higher than the record high 46 bushels, set in 1985 and 1992.

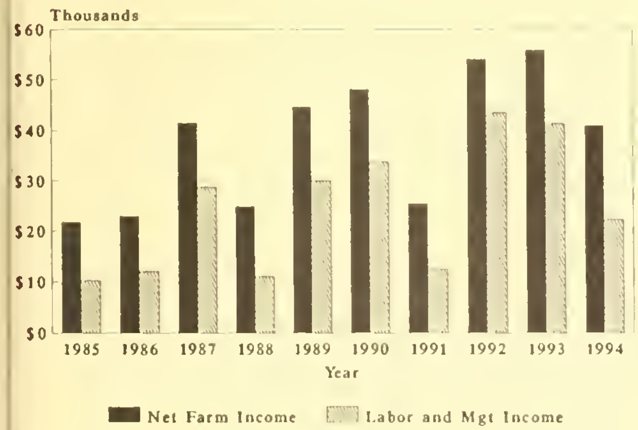

Figure 1. Average operator shares of net farm income and labor and management income, 1985 to 1994.

Even though yields were significantly higher in 1994 than the year before, lower grain prices resulted in gross crop returns averaging $330 per acre, only $1 per acre higher than 1993 returns. Returns to hog and beef producers in 1994 were significantly lower than the year before, while returns to dairy producers were higher. Farm earnings were higher in the central and north central areas of the state and lower in the south. Intensive hog and beef farms also posted low earnings.

Records kept by more than 3,500 farmers enrolled in the record-keeping program of the Illinois Farm Business Farm Management Association (FBFM) have been used to estimate changes in net worth from 1991 to 1994. On a cost basis, without considering inflation or deflation of capital asset values, the change was calculated by adding net farm to net nonfarm income and subtracting family living expenses, income taxes, and Social Security taxes (Table 1). Under this procedure, the net worth of the average Illinois farm operator decreased by $5,881 in 1991 but increased by $21,873 in 1992, by $21,908 in 1993, and by $6,165 in 1994.

The 1994 change in net worth on a balance sheet based on fair market value would be affected positively if it included the change in land values. On average, land values have increased by 43 percent since 1988. Changes in net worth would vary greatly among farms and regions depending on the levels of farm and nonfarm income and of family living expenses.

Table 1. Estimated Change in Net Worth and Capital Debt Repayment of Capacity for 3,635 Illinois Farm Operators[a]

	1991	1992	1993	1994
Net farm income	$25,294	$54,035	$54,439	$40,937
+Net nonfarm income[b]	12,226	12,166	13,122	13,566
– Family living expenses[c]	33,208	35,173	36,199	37,100
– Income and Social Security taxes[c]	10,193	9,155	9,454	11,238
Change in net worth	($ 5,881)	$21,873	$21,908	$ 6,165
+Depreciation	15,173	16,157	21,937	$22,504
Funds available for capital debt repayment	$ 9,292	$38,030	$43,845	$28,669
Capital purchases	$21,757	$18,828	$26,856	$28,393
Cash interest paid	$15,617	$15,194	$14,422	$13,423

[a]The number of operators is an average for the four years.
[b]Actual amounts identified from a sample of 540 farms for 1991, 1992, 1993, and 1994.
[c]Actual amounts identified from a sample of 540 farms for 1991, 1992, 1993, and 1994, reduced by 10 percent.

Net farm income is the accrued value of the operator's share of farm production minus total operating expenses (including interest paid and depreciation) plus gain or minus loss on machinery or buildings sold. Net farm income plus net nonfarm income is the total available to pay for family living expenses and for income and Social Security taxes. It is also the source of income used to pay the principal on intermediate- and long-term debt and to invest into savings.

Estimates used in Table 1 for net nonfarm income and withdrawals for living expenses and taxes were based on a sample of 540 Illinois farm families, most located in central Illinois. These families identified all sources of farm and nonfarm funds and the uses of these funds for precise expenditures. The expenditures were then adjusted downward by 10 percent to reflect the larger-than-average farms in central Illinois.

Capital debt repayment capacity

The average amount available to farm operators for repaying capital debt was estimated at $9,292 in 1991, $38,030 in 1992, $43,845 in 1993, and $28,669 in 1994 (Table 1). These were the funds estimated to be available for capital purchases and payment of principal on intermediate- and long-term debt. The table shows actual dollar commitments per farm for capital purchases of machinery, equipment, and buildings.

Results from the last four years indicate that in 1992 and 1993, the amount spent for capital purchases was less than the funds available for capital debt repayment; in 1991 and 1994, the reverse was true. Total capital purchases in 1994 were 6 percent higher than in 1993 and 51 percent higher than in 1992. Expenditures per tillable acre averaged $38 — the highest since 1981, when they averaged $44. Limited capital replacement during the mid-1980s together with with better farm earnings in 1989 and 1990 resulted in farmers' starting to increase their capital purchases in 1990 and 1991. Lower farm incomes in 1991 reduced the purchases in 1992, and improved earnings in 1992 and 1993 again increased purchases in 1993 and 1994.

Farmers' records show that funds available for debt repayment varied between regions. Estimated changes in net worth were positive in central and northern Illinois, where net worth increased $10,000 to $15,000, but in the southern part of the state were negative, dropping $10,000.

Interest paid as a percentage of gross farm returns

The interest paid by FBFM operators averaged 6.9 percent of gross farm returns in 1993, compared to 7.9 percent in 1992, 9.9 percent in 1991, and 8.8 percent in 1990. Preliminary analysis of the 1994 data indicates a figure similar to that in 1993.

The average cash interest paid in 1994 was $13,423, which was $999 lower than in 1993. This was the third year in a row that the amount decreased compared to the previous year. About 2 percent of farm operators had negative incomes in 1993 (Figure 2), paying more than 30 percent of their gross farm returns for interest. Seventy-four percent of the farm operators — the highest level since the late 1970s — were paying less than 10 percent of their gross farm returns for interest. The average income for these 74 percent was $7,812 higher than that for all operators.

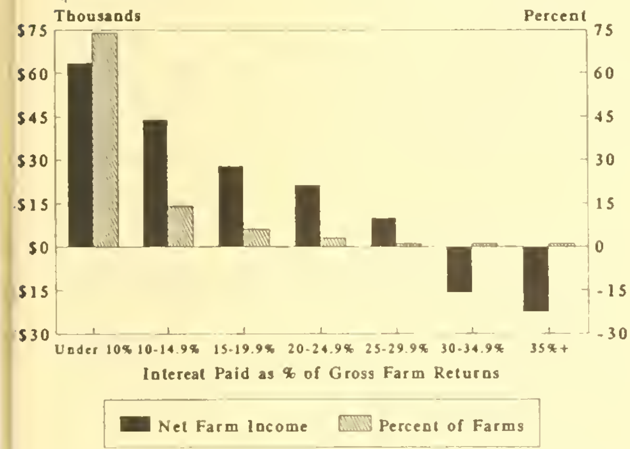

Figure 2. Operator's average net farm income and percent of farms by interest paid as a percent of gross farm returns, 1993.

Costs and returns from crops

Corn and soybeans are crops that make important contributions to net farm incomes and the financial status of Illinois farm operators. Figures 3 and 4 show the costs and returns per bushel for corn and soybeans produced from 1985 to 1994 on 630 central Illinois grain farms with high-quality soils and no livestock. Note that the total cost of growing a bushel of corn has exceeded the average annual Illinois corn price in four of the 10 years since 1985. The difference between the total of all costs and the total nonland costs is the charge for land use.

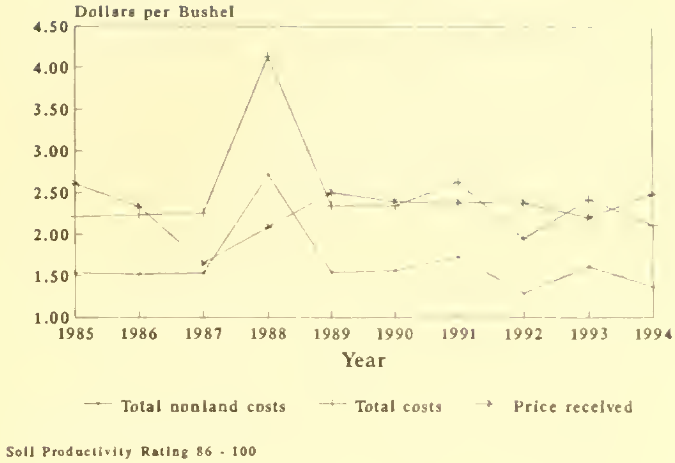

Figure 3. Costs and returns per bushel of corn on central Illinois grain farms, 1985 to 1994.

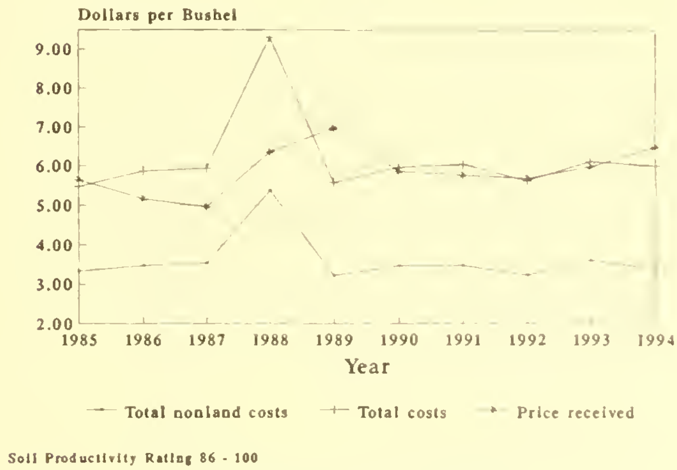

Figure 4. Costs and returns per bushel of soybeans on central Illinois grain farms, 1985 to 1994.

The deficits indicate that total returns for the year were below total economic costs, which includes a fair return to capital and unpaid operator labor. Income support provided by the government farm program has offset part of the deficits.

Variable cost, part of the nonland costs, reflects total cash expenditures for fertilizer, pesticides, seed, and drying (normally shared according to the terms of the lease on rented farms) plus fuel and machinery hire and repair. Other nonland costs include labor, depreciation, interest, building upkeep, and overhead.

Total costs per acre of corn produced in 1994 increased 6 percent from 1993. Record-high yields resulted in a decreased cost per bushel of production, from $2.42 in 1993 to $2.11 in 1994. Using the past four-year average corn yield of 160 bushels per acre, costs per bushel of corn produced are now averaging about $.93 for the variable cost, $1.56 for the total nonland cost, and $2.40 for the total cost.

Figure 4 shows the costs and returns per bushel of soybeans produced on these same farms from 1985 to 1994. Total cost has exceeded returns in six of the last ten years. Total costs per acre increased by 4 percent in 1994. Recent high yields resulted in a 12-cent decrease in the cost per bushel in 1994. Using the past four-year average yield of 49 bushels per acre, costs per bushel are now averaging about $1.82 for the variable cost, $3.61 for the total nonland cost, and $6.37 for the total cost.

Costs and returns from livestock

Livestock have also been important to the current financial status of farm operators. Figure 5 shows the costs and returns per hundredweight of pork produced annually from 1985 to 1994 on an average sample of 98 farrow-to-finish enterprises with an average of 459 litters per year. Returns were significantly lower in 1994 than in 1993. Returns in 1994 were also lower than the last five-year average. Prices received for market hogs were 13 percent lower in 1994 than in 1993, with feed costs slightly higher.

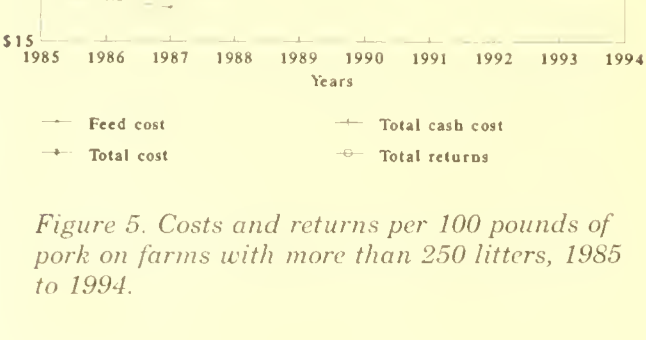

Figure 5. Costs and returns per 100 pounds of pork on farms with more than 250 litters, 1985 to 1994.

Table 2 details the average returns above the cost of feed and purchased animals from the annual records of about 1,200 individual livestock enterprises from 1990 to 1994. Return is the amount available to pay for labor, machinery, equipment and building repairs, depreciation, livestock expense, taxes, overhead, and an interest charge on all capital used. There is no economic profit until these costs are covered.

The last five-year average returns from the farrow-to-finish hog and dairy enterprises covered total costs. The feeder-pig finishing, feeder cattle, and beef cow enterprises operated below a break-even level. Based on the estimates of nonfeed costs in Table 2, the average returns above all costs from 1990 to 1994 for farrow-to-finish hogs were $17.96 (returns above feed and purchased animals) minus $16.22 (nonfeed costs), yielding a positive $1.74 per 100 pounds produced. For feeder-pig finishing, total costs per hundredweight exceeded returns by an average of $2.26. Feeder cattle showed returns per hundredweight that were $8.17 short of covering all costs; dairy returns averaged $208 per cow above all costs, whereas beef cow herds were $104 short per cow.

Dairy was the only livestock enterprise for which returns were higher in 1994 than in 1993; returns to the other livestock enterprises were significantly lower. Prices received for market hogs were 13 percent lower in 1994 and slaughter cattle prices were 12 percent lower, while milk prices were 3 percent higher. Feed costs, the largest single expense in raising livestock, were slightly higher for all livestock enterprises. The dairy enterprise realized a positive return to management, which meant returns were more than total economic costs.

Returns to most livestock enterprises decreased last year as the level of meat production continued to increase, putting pressure on livestock prices. Producers continue to increase the sizes of their enterprises and operate at efficient levels. Pigs weaned per litter averaged 8.27, while feed conversion was at its lowest ever, averaging 365 pounds of feed per 100 pounds of pork produced. The average pounds of milk produced per cow increased to 17,444—

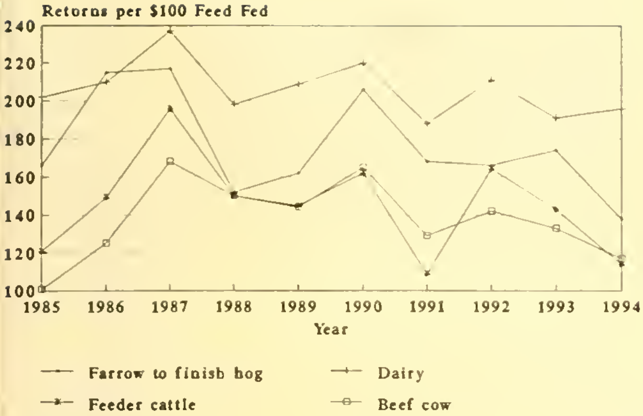

Figure 6. Returns per $100 of feed fed for selected livestock enterprises.

up from 16,970 in 1993. Since 1987, returns per $100 of feed fed have been trending downward for the major livestock enterprises in Illinois (Figure 6). Future returns will greatly depend on when and to what degree producers respond to various profit margins by increasing or reducing production and by continuing to improve production efficiencies.

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Table 2. Returns Above Cost of Feed and Purchased Animals to Livestock Enterprise Units from 1990 to 1994

	Dollars per hundredweight			Dollars per cow	
Year	Farrow-to-finish hogs	Feeder-pig finishing	Feeder cattle	Dairy cattle	Beef herd calves sold[a]
1990	27.15	15.79	25.74	1,471	203
1991	17.67	6.80	3.97	1,064	88
1992	16.45	9.39	25.40	1,398	125
1993	18.76	7.89	17.10	1,178	92
1994	9.77	2.33	5.66	1,270	(2)
5-year average	**17.96**	**8.44**	**15.57**	**1,276**	**101**
Nonfeed costs, 1989–1993					
Direct cash	6.58[b]	4.12[c]	12.51[b]	454[b]	30[c]
Other costs	9.64[b]	6.58[c]	11.23[b]	614[b]	175[c]
Total	**16.22**	**10.70**	**23.74**	**1,068**	**205**

[a]The feed cost for beef herds includes up to $60 of hay equivalent from salvage roughage.
[b]Estimates of annual nonfeed costs are based on enterprise cost studies of operative units from 1989 to 1993.
[c]Includes veterinary costs, utilities, fuel, equipment and building repair costs, depreciation, labor, and other nonfeed costs, including interest on feeder livestock, from *Crop and Livestock Budgets, Examples for Illinois,* 1993–1994. AE-4700, April 1993.

Cooperative Extension Service

FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

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Farm and Family Living Income and Expenditures, 1991 through 1994

In 1994, the total noncapital living expenses of 540 farm families enrolled in the Illinois Farm Business Farm Management Association (FBFM) averaged $36,079, or $3,007 a month for each family (Table 1). This average was 2.4 percent higher than in 1993 and 5.1 percent higher than in 1992. Another $5,143 was used to buy capital items (such as furniture, household equipment, and the personal share of the family automobile) for total average living expenses of $41,222, an increase of 2.5 percent from 1993. The average increase was $147 for capital expenses and $854 for noncapital expenses. Most of the sample farms, primarily grain farms, were located in a 15-county area of central Illinois bounded by Jacksonville, Peoria, Champaign, and Mattoon.

Figure 1 illustrates the annual capital and noncapital family living expenditures and income and Social Security tax payments for 1985 through 1994. Total family living expenses increased 5.14 percent annually during this period. Income and Social Security tax payments have increased since the mid-1980s as a result of improved farm earnings, the elimination of the investment tax credit, and an increased Social Security tax rate. Income taxes paid in 1994 were at the highest level ever, averaging $12,487. Medical expenses averaged more than $5,000 for the third year in a row. Since 1989, medical expenses have increased $1,211, or 31 percent.

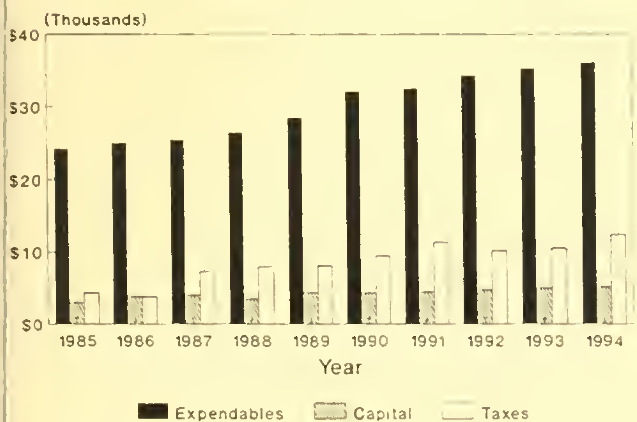

Figure 1. Noncapital and capital family living expenditures and income tax and social security payments, 1985 to 1994.

How families use their funds depends somewhat on the levels of net income from farm and nonfarm sources and their priorities for expenditures. In this sample, the 1994 net farm income decreased considerably ($14,489 per farm). Net nonfarm income, which averaged more than $13,000 for the second year in a row, increased by $444 in 1994.

The amount of interest expense paid by each farm operator decreased from $14,121 in 1993 to $13,004 in 1994. As a percentage of farm receipts, interest paid decreased from 6.4 percent in 1993 to 6.0 percent in 1994 (the result of lower interest expense, despite a decrease in total receipts). This is the lowest level for interest paid since 1977, when it was 5.9 percent. The highest level since 1984 was in 1984 and 1985, when it was 14.1 percent.

As a percentage of cash operating expenses, the interest paid decreased from 9.2 percent in 1993 to 8.1 percent in 1994. Cash farm receipts were $281 per tillable acre, a decrease of $14. Cash operating expenses, including interest,

Table 1. Average Sources and Uses of Funds Over Four Years and by Noncapital Living Expenses for Selected Illinois Farms

	All records, average per farm				Family of 3 to 5, 1994[a]	
	1994	1993	1992	1991	High third	Low third
Number of farms in sample	540	467	452	456	107	107
Tillable acres farmed	772	746	755	731	1,027	683
Acres owned	130	125	132	131	142	102
Farm assets, January 1[b]	$489,103	$432,768	$426,539	$381,588	$579,418	$396,810
Farm assets, December 31[b]	503,589	450,325	450,722	383,283	599,691	411,011
Liabilities, January 1	219,667	220,410	218,402	198,764	300,641	191,141
Liabilities, December 31	247,748	223,353	229,076	202,708	340,431	220,947
Net farm income	41,242	55,731	55,759	30,596	59,876	29,611
Source of dollars						
Net nonfarm income	$ 13,566	$ 13,122	$ 12,166	$ 12,226	$ 16,519	$ 13,360
Money borrowed	165,931	135,712	144,676	118,446	251,954	126,774
Farm receipts	217,181	220,045	193,259	177,832	283,429	194,007
Use of dollars						
Interest paid	$ 13,004	$ 14,121	$ 16,006	$ 15,550	$ 17,679	$ 11,081
Cash operating expenses	146,795	139,570	125,392	111,037	187,583	137,635
Capital farm purchases	30,301	26,946	19,867	22,829	39,403	28,914
Payments on principal	137,948	135,090	134,566	113,510	210,869	97,971
Income and Social Security taxes	12,487	10,504	10,172	11,326	15,783	8,884
Net new savings and investment	14,921	2,427	5,017	–2,646	21,322	20,618
Living expenses						
Contributions	$ 1,410	$ 1,290	$ 1,285	$ 1,271	$ 1,867	$ 571
Medical	5,064	5,357	5,022	4,675	6,422	3,380
Insurance, life and disability	2,536	2,413	2,431	2,268	3,403	1,456
Expendables	27,069	26,165	25,598	24,266	41,600	18,588
Total noncapital expense	(36,079)	(35,225)	(34,336)	(32,480)	(53,292)	(23,995)
Capital	5,143	4,996	4,745	4,418	5,971	5,043
Total, living expenses	$ 41,222	$ 40,221	$ 39,081	$ 36,898	$ 59,263	$ 29,038
Percent change, total noncapital living expenses	2.6	5.7	1.2	12.66		

[a]Records were sorted into three categories according to total noncapital living expenses. Only the high an low thirds are compared here.

[b]Modified cost basis, except bare land values were held at current values between January 1 and December 31.

increased only $1 per tillable acre. Machinery and building purchases increased from $26,946 in 1993 to $30,301 in 1994, the highest level since 1979.

Debt-to-Asset Ratio Decreases

The sample of farms showed an average debt of 49 cents for each $1 of farm assets as of December 31, 1994; machinery was valued at cost, minus depreciation. The debt for each $1 of assets was 50 cents on December 31, 1993. The amount of debt and the value of farm assets both increased from the previous year. This debt-to-asset ratio would be lower if machinery were valued at a current market value or if nonfarm assets were included.

The farms in this sample were 33 acres larger on average than the 7,200 farms in the FBFM record-keeping program. Crop yields averaged about 5 percent more than those reported by the Illinois Crop Reporting Service. Average operator's farm income for this sample of farms was slightly higher than for all Illinois record-keeping farms. The average operator's net farm income of all Illinois record-keeping farms was $40,937, or $305 less than the average net farm income for this sample. The average living expenditures for farms in this sample are estimated to be 15 to 20 percent above the average of all Illinois farm operators having more than $40,000 gross sales per farm, because the average net farm income for this sample is usually higher than the average for all farms.

In 1994 the operators of these 540 farms averaged 46 years of age. Families averaged 3.6 members, with the oldest dependent child being 10 years old. They farmed 772 tillable acres, of which they owned 130, or 17 percent. The operators kept records so that all sources of funds, both farm and nonfarm, balanced with all uses of funds in a complete monthly cash-flow accounting system.

In Table 1, the total family living expenses are divided into five categories. "Expendables" includes cash spent for food, operating expenses, clothing, personal items, recreation, entertainment, education, and transportation. This category also includes selected itemized deductions, such as the personal share of real estate taxes. Cash spent for capital improvements exceeding $250 is not included. The use of rented houses (true for an estimated 40 to 50 percent of the farms in this sample) is not included, since these data cover only cash outlays.

Noncapital living expenditures per tillable acre remained constant at $47 per tillable acre. During the last decade, that figure has varied from $38 to $47. The excess on nonfarm taxable income over nonfarm business expense was $13,566 in 1994, or 33 percent of the total living expense, the same percentage as in 1993. Nonfarm income includes dividends on stocks, interest on savings and money-market funds, income from other nonfarm investments, and income from off-farm employment performed by family members. Interest earned and left in savings accounts not included in the cash flow is not reflected in the nonfarm income.

Assets and Liabilities Increase

The value of farm assets and the amount of liabilities for this sample of 540 farms both increased from a year earlier. The value of farm assets on December 31, 1994, was $53,264 more than in 1993. The increase reflects the fact that land prices increased modestly and operators have been buying more machinery and equipment. At the same time liabilities increased by $24,395. These farms borrowed $27,983 more than they made in principal payments for the year. In 1993, the amount borrowed exceeded principal payments by only $622. The amount spent on capital purchases for machinery and equipment was $30,301, or $39 per tillable acre, an increase of $13 and $3 per tillable acre from 1992 and 1993, respectively.

Although they are lower than in the early 1980s, interest payments continue to be one of the highest farm expense items. Interest paid — on operating, intermediate, and real estate debt — decreased from 1993 to 1994. From 12 percent of total farm operating expense in 1979, it increased to 21 percent in 1983 and dropped to 8 percent in 1994. The $13,004 average interest payment in 1994 was 6.0 percent of total cash farm receipts, down from 6.4 percent in 1993.

High-Third and Low-Third Comparison

The records from farm families with three to five people were sorted into three categories according to the amount of reported noncapital living expenses. Only the high and low thirds are compared here. Total living expenses for those in the high third averaged $59,263, compared with $29,038 for the low third. Figure 2 illustrates total living expenses for these two groups for 1985 through 1994.

The high third farmed 344 more acres and owned 14 percent of the land farmed; the low third owned 15 percent of the land farmed. The larger farms in the first group had more income for living expenses and income tax. Net farm plus nonfarm income was $76,395 for the high third and $42,971 for the low third. The average age of operators in the high third was 43 and the number of family members was 4.2, compared with 40 years of age and 3.9 family members for the other group.

Subtracting total living expenses and income and Social Security taxes from the total of net farm and nonfarm income results in a positive balance of only $1,349 for the high third and $5,049 for the low third. Figure 3 illustrates this balance for the two groups for 1985 through 1994. It is interesting to note that although farms in the low third had less income than those in the high third, they had more funds remaining after what was spent for family living and taxes.

Farm operations continue to grow in size, with more funds flowing in and out of the business as a result. More lenders are requiring cash flow projections and continual monitoring of these projections. More farmers thus need to learn how to balance and monitor their monthly cash flow. Computer program assistance is becoming available in more service centers, such as most FBFM Association district offices. These centers can help farmers project monthly cash flow on computer printouts so that they can compare projections with actual results. Increased use of microcomputers for farm accounting purposes should help operators account for all funds.

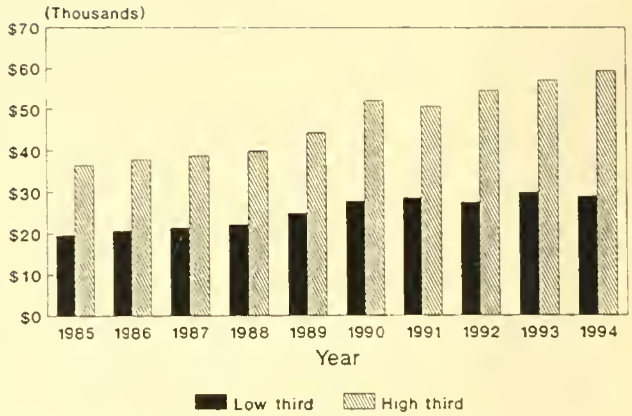

Figure 2. Total family living expenditures for families with three to five people, sorted into high and low thirds according to noncapital living expenses, 1985 through 1994.

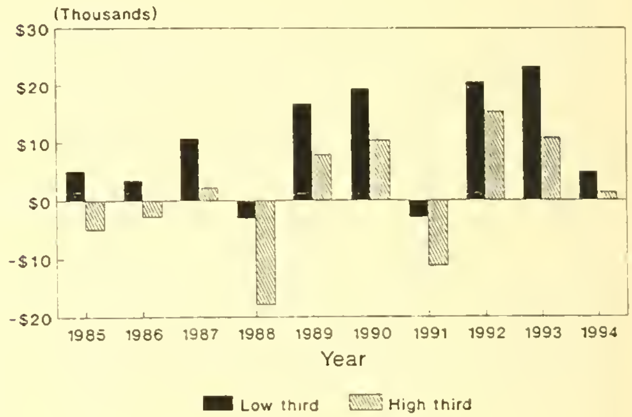

Figure 3. Average of net farm plus nonfarm income minus total family living expenses and income and Social Security taxes paid, sorted into high and low thirds according to noncapital living expenses, 1985 through 1994.

For any farm operator with low equity or a very high debt-to-asset ratio, this type of accounting is critical. All operators need to be able to account for all of their sources and uses of funds to make sound financial management decisions, but the consequences of poor record keeping can be greater for operators in tight financial positions.

The data summarized in this process may also help guide budgeting allowances for family living expenses. For families in this sample, living expenses averaged $53 for each tillable acre farmed. If the net nonfarm income of $18 per tillable acre is used for living, $35 per tillable acre must be generated from the farm business to meet family living requirements. Since 1983, this amount has varied only $7 per tillable acre, ranging from $29 to $36. Each family must determine how much each acre of crop or each litter of hogs should contribute to their living expenses. This amount, when added to production costs and other obligations, can help to determine break-even prices needed for products sold.

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Issue 95-9 *August 1995*

The Effect of Urbanization on the Farmland Market

The farmland market in the states along the Eastern seaboard, particularly from Massachusetts south, has long been affected by the area's expanding population and urbanization. In fact, when land prices here in the Midwest dropped by 40 or 50 percent from 1981 through 1986, there was hardly a ripple in the farmland market east of the Appalachians. There were some farmers (real full-time farmers) in Connecticut and Maryland who sold their farmland (traded, actually, to delay or defer capital gains taxes) in the mid-1980s and purchased several times as much land here in central Illinois. They gave up dairying, sold their eastern land for urban development, and got so much more land here that they adopted the relative leisure of grain farming, with higher yields than they could ever hope for in their former region. Those moves by a handful of farmers had only a marginal effect on farmland prices, especially in the mid-'80s, when land prices had reached the bottom of the trough.

The farmland market in some of our sister states, such as Ohio, Michigan, and Indiana, already depends as much on urbanization as on the prices of farm commodities. Illinois too is becoming a state where the proximity and pace of urbanization have a strong effect on farmland prices.

Quantification of this effect in the market is very difficult without spending a lot of research time examining farmland sales data. Who is buying how much farmland at what prices, where are the buyers from, and what is the source of their money? Some of this information is in the "green sheets" (the real estate transfer declarations required by law) on record in county courthouses scattered over the state and in the Illinois Department of Revenue in Springfield. Some land is being purchased by "land trusts," in which case it may be almost impossible to ferret out the owner's name.

However, we know first-hand and from our many friends in the real estate brokerage business that a higher proportion of farmland buyers are from urban or suburban areas, particularly the Chicago and St. Louis regions, and they are buying with trades and cash. Buyers are beginning to come as far as 70 to 100 miles outside metropolitan Chicago, with the interstate highway corridors to the west being affected the most. The price of DeKalb County farmland (60 to 70 miles west of Chicago), for example, has grown much faster than the average for the state over the last five years. Some of this demand is spilling into adjacent counties.

Buyers from the Belleville–St. Louis region are moving into the periphery around St. Clair and Madison counties. The several lakes in that area create a higher demand for recreational land and for building sites for both primary and secondary homes. Some small parcels in the area sold for $500 to $700 an acre about three years ago; they now are going for two or three times as much.

Several other Illinois metropolitan regions are developing rapidly—the Rockford–Belvedere area, Bloomington–Normal, Champaign-Urbana, and Springfield. Some of the older industrial cities, including Peoria, Decatur, and Danville, are not showing as much expansion. Due in part to rather ineffective zoning, expansion is leap-frogging all over Will County, where the county seat is Joliet, an old industrial city on the Illinois River about 40 miles southwest of Chicago.

Urbanization, commercialization, industrialization, retail centers, computerization of services, and offsite office communication that allows more people to live wherever they want are all tending to support or increase farmland values through a trickle-down effect.

Other factors lifting land prices

Additional factors tend to support or increase farmland prices. Interest rates have been relatively low and could go lower if inflation is kept in check, which is more likely with recent trade agreements. It is not unthinkable that we could return to an era like the 1950s and 1960s, when mortgage rates were 5 to 6 percent and savings rates 2 to 3 percent. Returns in other investments on a current account basis have not been very competitive recently with returns on land.

Returns per acre on land will tend to increase in Illinois on a structural basis until cash leasing runs its course and farm operators find it unprofitable to bid cash rents higher. Cash rents are becoming the dominant arrangement on new leases. But there are many farms where rents could still rise significantly. Recently a large acreage that formerly rented for $80 per acre was rented for $130 per acre on a six-year lease at a rent auction. The increase in rent capitalized at 6 percent is worth $800 per acre in land value. We don't know how many similar situations exist that will tend to raise returns to land with higher land prices following. Such scenarios will ultimately result in lower per-acre income for farm operators who don't own a high proportion of the land they farm, making land purchase more difficult for many operating farmers.

We do know that there are many institutional buyers in the market and that when one of them buys land, the lease is usually changed to cash rent, producing a higher net return to the landowner than was generated previously. This experience suggests that institutions can pay more for land than farmers have been willing to pay and get higher returns than the owners traditionally received.

As farms get larger and more land is held by absentee owners, more of the profits produced will be drawn out of the local communities via the rent going to the institutions and absentee owners. My concern is that moving toward this type of ownership may eventually push American agriculture toward the *lati-fundia* type of peasant agriculture under large absentee ownership and control, as exists in many countries of South America.

Negative factors on land prices

There are also factors on the horizon that may be negative for land prices. After 60 years of strong government support programs in agriculture, we may be approaching a period when subsidies are going to be eliminated or reduced substantially. Our recent horseback estimate is that doing away with all corn subsidies could mean as much as a $300-per-acre hit on land prices, along with a significant decline in operators' incomes.

Another factor that could affect land prices negatively in the short run is a change in the income tax on capital gains. The supply of good land at the present time is fairly tight, with less land moving this summer than normal. Part of this is the anticipation by many owners who would like to sell and reinvest their money elsewhere that Congress will reduce taxation on capital gains. A lot of land that was purchased during the 1950s and 1960s has a tax base of less than $400 an acre. Selling today at $2,000 to $2,500 an acre leads to a real bite from Uncle Sam, and so much less money to reinvest elsewhere that it really is not worth selling. If Congress does reduce the capital gains tax, we will see a larger supply of land on the market and somewhat lower prices. Even at somewhat lower prices, some owners will net more than they would have with the capital gains tax. So if capital gains taxes are lowered, we may see a window of opportunity for two to three years when some good land can be purchased at more reasonable prices.

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

Issue 95-10 *October 1995*

1996 Certified Farmland Assessed Values Up for Lower Quality Soils and Down for Higher Quality Soils

Introduction

For 1996, the certified farmland assessed values for soils with productivity index values 60 through 100 increased 10 percent while the values for soils with productivity index values greater than 100 increased less than 10 percent or declined slightly. This confusing picture is the result of the interaction of the 1986 10 percent limit law and changes in the underlying economic conditions in Illinois agriculture. The agricultural economy drives use-value farmland assessment calculations. The increase in certified values for index values 100 and less was restricted by the 1986 10 percent limit law because the increase in calculated values between 1995 and 1996 exceeded 10 percent. The certified values for productivity index values 101 through 130 were the values calculated following the use-value formula because the change from 1995 to 1996 was less than 10 percent. The increase for soil productivity index values 101 through 108 averaged close to 5 percent. The 1996 certified values for productivity index values 109 through 130 were, on average, 4 percent less than 1995 certified values. These certified values were issued to county assessing officials in May 1995 and will be the bases for 1996 farmland assessments.

After four years of steadily declining certified assessed values for farmland (1988, 1989, 1990, and 1991), certified farmland assessed values increased for four consecutive assessment years (1992, 1993, 1994, and 1995). Certified values for 1996 show both increases and decreases.

The farm economy's poor performance in the early and mid-1980s, evidenced by weak commodity prices and high interest rates, put significant downward pressure on certified assessed values for farmland through 1991 assessments. The strengthened economic conditions in Illinois agriculture (that is, relatively higher commodity prices and relatively lower interest rates) put upward pressure on farmland assessments through the 1995 assessment year. Weaker prices, rising interest rates, and higher production costs characterize the Illinois farm economy most recently and caused a confusing picture for the 1996 certified values.

1996 Certified Assessed Values by Soil Productivity Index

The per-acre certified assessed values for cropland that assessing officers will use to determine the 1996 assessed value of farmland throughout Illinois are shown in Table 1. For comparison, 1995 certified values are also presented. The 1996 assessed values on farms will be the base for taxes paid by farm owners in 1997. The index ranges from 60 to 130, and the 1996 certified values range from \$11.82 per acre to \$360.81 per acre. The assessor applies the appropriate certified value in calculating the taxable value of farmland in each farm tax parcel after determining the soil productivity index for the parcel and the use of the land in farming. The farmland assessment is added to assessments for buildings, building sites, the home, and home site to get the total taxable value on each farm parcel.

Table 1. 1995 and 1996 Certified Farmland Equalized Assessed Value (EAV) by Soil Productivity Index

Productivity index (average management)[a]	1995 certified EAV[b]	1996 certified EAV[b]	Productivity index (average management)[a]	1995 certified EAV[c]	1996 certified EAV[b]
	-----*dollars per acre*-----			-----*dollars per acre*-----	
60	10.75	11.82	96	136.95	150.65
61	11.62	12.78	97	143.51	157.86
62	12.52	13.77	98	150.19	165.21
63	13.38	14.72	99	156.97	172.66
64	14.26	15.69	100	163.77	180.15
65	15.12	16.64	101	170.73	187.29
66	16.02	17.62	102	177.76	192.64
67	16.88	18.57	103	184.80	198.03
68	17.76	19.54	104	191.96	203.47
69	18.62	20.49	105	199.22	208.96
70	19.50	21.45	106	207.10	214.49
71	20.37	22.40	107	215.85	220.07
72	24.08	26.49	108	224.62	225.69
73	27.80	30.58	109	233.38	231.35
74	31.51	34.66	110	242.13	237.07
75	35.21	38.73	111	250.89	242.82
76	38.92	42.81	112	259.64	248.63
77	42.63	46.90	113	268.38	254.47
78	46.32	50.96	114	277.14	260.37
79	50.03	55.03	115	283.75	266.30
80	53.75	59.12	116	289.36	272.29
81	57.45	63.20	117	295.00	278.32
82	61.16	67.27	118	300.68	284.39
83	64.84	71.33	119	306.39	290.51
84	65.58	75.44	120	312.15	296.68
85	72.28	79.51	121	317.94	302.89
86	75.97	83.57	122	323.77	309.14
87	81.17	89.29	123	329.64	315.44
88	87.06	95.76	124	335.55	321.79
89	92.94	102.24	125	341.49	328.18
90	99.02	108.92	126	347.47	334.62
91	105.17	115.68	127	353.49	341.10
92	111.33	122.46	128	359.55	347.62
93	117.61	129.37	129	365.65	354.20
94	123.94	136.33	130	371.78	360.81
95	130.41	143.45			

Source: Illinois Department of Revenue, Certification Memos, 1995 and 1996.

[a]Average management productivity index is the average of the basic and the high-level management indexes as reported in *Soil Productivity in Illinois*, Illinois Cooperative Extension Service Circular 1156, 1978.

[b]110 percent of 1995 certified values for productivity index figures 60 to 100; certified values for productivity index figures 101 to 130 are actual calculated values.

[c]110 percent of 1994 certified values for productivity index figures 60 to 100; certified values for productivity index figures 101 to 130 are actual calculated values.

The certified values for 1996 in Table 1 are 110 percent of the values certified in 1995 for soil productivity index values 60 through 100 because the assessed values calculated with the income capitalization formula required by the Illinois Farmland Assessment Law were more than 110 percent of the 1995 values for soils in this quality range. For soil productivity index values 115 through 130, the 1996 certified values changed less than 10 percent from the 1995 certified values, so the values actually calculated by the income capitalization formula were certified in 1996 for soils in this quality range. For soil productivity index values 101 through 108, 1996 certified values were higher than 1995 certified values but by less than 10 percent (an average increase of 5 percent). For soil productivity index values 109 through 130, 1996 certified values were less than 1995 certified values but by less than 10 percent (an average decrease of 4 percent).

Some clarity can be provided on the relationship between calculated and certified values and the interaction with the 1986 10 percent limit law by reviewing certified and calculated values for selected soil productivity index values for the past few years. Figures 1 and 2 present certified and calculated farmland assessed values for soil productivity index values for assessment years 1992 through 1996 (taxes payable in 1993 through 1997) for productivity index values of 75, 90, 105, and 120, respectively. The calculated values are driven by the underlying economics of Illinois agriculture. The certified values cannot change by more than 10 percent from one year to the next because of the 10 percent limit law. If the change is 10 percent or less, the calculated values are

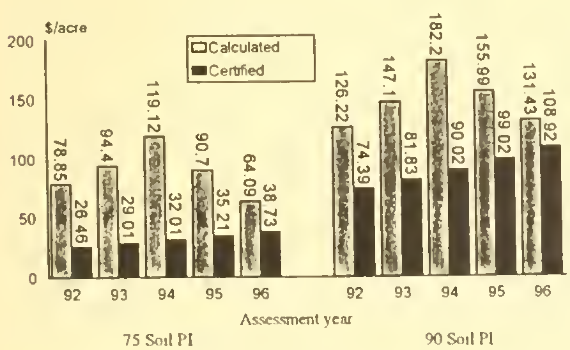

Figure 1. Calculated and certified farmland assessed values for soil productivity indexes 75 and 90, 1992-1996.

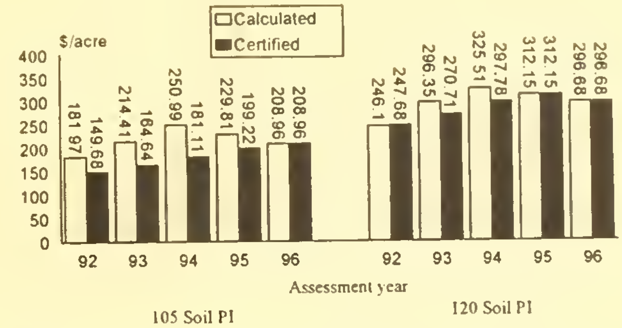

Figure 2. Calculated and certified farmland assessed values for soil productivity indexes 105 and 120, 1992-1996.

the values certified. For soil index values 75 and 90, the certified value during these years was always determined by the 10 percent law. From 1992 through 1996, calculated values are approaching certified values from above; the 10 percent law has held assessments on lower quality soils below the level determined by the economics of Illinois agriculture.

For soil index value 105, the 10 percent limit law has had an impact similar to the impact for soil productivity index values 75 and 90. However, in 1996, the calculated and certified values were equal. The limit law was not applicable. For soil productivity index value 120, the limit law was not binding at all from 1992 through 1996, and calculated values were the values certified to assessing officers.

The Income Capitalization Formula

The income capitalization formula required by the Illinois Farmland Assessment Law is:

$$\text{Value} = \frac{\text{gross income per acre less per-acre nonland production costs}}{\text{average Farm Credit Service mortgage interest rate}}$$

The formula uses five-year-average data to calculate the per-acre certified assessed value for cropland. There is a two-year lag between the assessment year and the last year of the data used in the calculations. For example, the 1996 calculations, which had to be completed before May 1995, used data from 1990 through 1994. Lags in data used for the mass appraisal of property for tax purposes are very common. Because income and costs vary by soil quality, a separate calculation is done for each soil productivity index value.

Note the arithmetic of the income capitalization formula:

- a higher (lower) gross income caused by higher (lower) crop prices increases (decreases) the value;
- lower (higher) nonland production costs increase (decrease) the value; and
- a lower (higher) average Farm Credit Service mortgage interest rate increases (decreases) the value.

It is relatively easy, from the arithmetic of the formula, to identify the general impact that changes in commodity prices, nonland production costs, and interest rates have on certified farmland assessed values. Certified farmland assessed values are directly related to crop prices and indirectly related to nonland production costs and interest rates.

Factors Underlying the 1996 Certified Values

Five-year average commodity prices and nonland production costs put downward pressure on the 1996 certified values. Meanwhile, a lower five-year average interest rate put upward pressure on these values. Commodity prices are one of the major factors influencing the calculation of certified values. The relationship between commodity prices and calculated certified assessed values on farmland is direct; higher prices result in higher calculated values, and lower prices result in lower calculated values.

The commodity prices for 1976 through 1994 are presented in Table 2. The five-year average prices used to compute farmland certified assessed values are calculated from these prices. For example, the average price for the 1996 assessment calculation is the average price from 1990 through 1994. For corn, this is $2.38; for soybeans, it is $5.92. Both five-year average prices are slightly lower than the prices averaged from 1989 through 1993 that were used to calculate 1995 certified values. Thus, average commodity prices put a little downward pressure on 1996 certified farmland values.

Figures 3 and 4 present the five-year average prices used in the assessment calculations for 1981 through 1996. Figure 3 shows the average corn price by assessment year, and Figure 4 shows the average soybean price by assessment year. The decline in average prices that began in 1986 put downward pressure on the calculated assessed values. With the leveling of average prices in assessment year 1991 and upward price movements in 1992, 1993, and 1994, calculated assessed values were pressured up by stronger five-year average commodity prices. With the decline in average prices beginning in the 1995 assessment year, the upward pressure on certified values from commodity prices was relaxed.

Table 2. Illinois Commodity Price Summaries, Calendar Years 1976 to 1994[a]

Year	Corn	Soybeans	Wheat	Oats
	----(dollars per bu)----			
1976	2.54	5.65	2.98	1.44
1977	2.07	6.84	2.19	1.32
1978	2.12	6.32	2.93	1.28
1979	2.43	6.96	3.75	1.43
1980	2.78	6.90	4.02	1.58
1981	2.99	7.03	3.79	1.99
1982	2.43	5.88	3.12	1.92
1983	3.04	6.86	3.36	1.95
1984	3.13	7.14	3.34	1.81
1985	2.53	5.53	3.17	1.70
1986	2.00	5.09	2.80	1.26
1987	1.61	5.16	2.69	1.67
1988	2.32	7.28	3.41	2.30
1989	2.49	6.74	3.99	1.92
1990	2.46	5.92	3.09	1.29
1991	2.42	5.72	2.72	1.20
1992	2.34	5.64	3.34	1.53
1993	2.25	6.12	3.17	1.59
1994	2.45	6.21	3.24	1.44

SOURCE: Illinois Crop Reporting Service
[a]Price used in farmland assessment computations.

The 1990 prices for corn ($2.46) and soybeans ($5.92) will be replaced by 1991 prices in the 1997 assessment calculations. The five-year average prices that will be used in the 1997 farmland assessed valuation calculations will certainly be no higher than the average prices used in the 1996 calculations. The pressure for lower assessments from weaker five-year average commodity prices, which began with 1995 assessments and continued with the 1996 assessments, likely will continue with 1997 farmland assessed values.

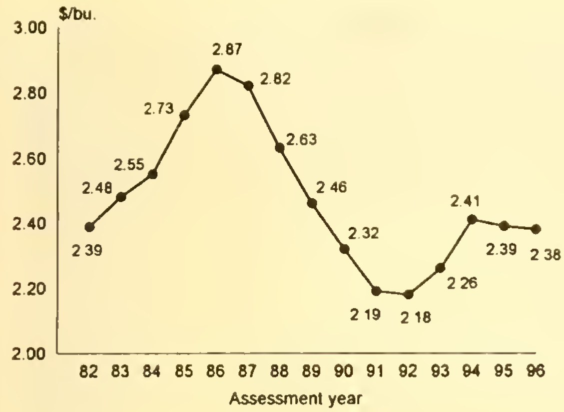

Figure 3. Average corn price for assessments.

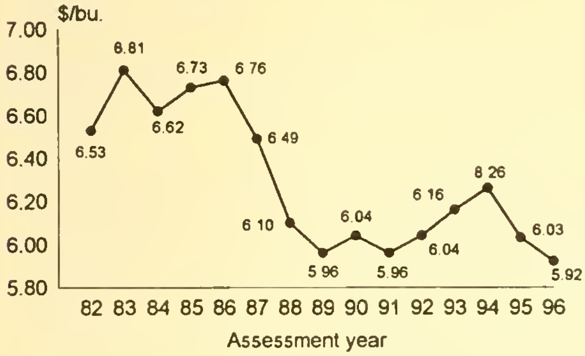

Figure 4. Average soybean price for assessment.

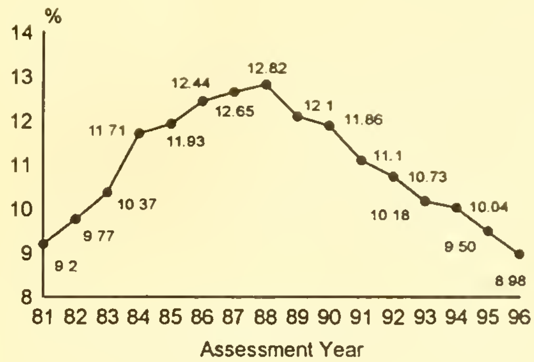

Figure 5. Farmland assessment capitalization rates.

Another major determinant of the certified assessed values is the five-year average Farm Credit Service mortgage interest rate. This rate is used as the capitalization factor in the formula. There is an inverse relationship between the capitalization factor and calculated assessed values; a higher interest rate results in lower assessed values and a lower interest rate results in higher assessed values. The five-year average interest rates by assessment year are presented in Figure 5. Beginning with assessment year 1981, the interest rate increased steadily through assessment year 1988. A lower interest rate combined with weak commodity prices to put substantial downward pressure on the calculated assessed values during this time period. However, with the 1989 assessment year, a lower interest rate began to put upward pressure on assessed values.

Beginning in assessment year 1992, stronger five-year average commodity prices combined with a lower five-year average mortgage interest rate from the Farm Credit Service to put significant upward pressure on calculated assessed values for farmland. The upward pressure was great enough to trigger the 10 percent limit law, restricting the increase in certified values from 1992 to 1993 to 10 percent. The increase was also limited to 10 percent in 1994 as stronger prices and a lower interest rate combined with 1992 and 1993 assessment year increases not yet included in certified values. These factors drove the 1994 calculated values above 1993 certified values by substantially more than 10 percent. For 1995, the 10 percent restriction was required for soil productivity index values 60 through 114, but it was not binding for soil productivity index values 115 through 130. The net income component in the 1995 calculations was lower than in the 1994 calculations. The upward pressure on the 1995 certified farmland assessed values came entirely from the lower capitalization rate and the inclusion of increases from previous years in the 1995 values. For 1996 certified values, the upward pressure from the capitalization rate was insufficient to offset downward pressure from higher five-year average nonland production costs and lower five-year average commodity prices. Certified values fell slightly in 1996 for all soil productivity index values that had accommodated all increases from previous years associated with the imposition of the 10 percent limit law. The expectation for 1997 is that more of the soil productivity index values will experience weak assessments. Higher certified values will continue for poor-quality soils as the unincorporated increases of prior years associated with the restrictions of the 10 percent limit law are rolled into the certified values.

Farmland Assessments in the Future

Changes in farmland assessments for the rest of the 1990s will be directly linked to the performance of the farm economy. This should not be a surprise. Strengthened economic conditions will move assessments up. Weak fundamentals will put downward pressure on assessments. Remember, the values in Table 1 are for assessment year 1996 and are based on data from 1990 through 1994. The 10 percent limit law restricted the increase in certified assessed values for lower quality soils in 1992, 1993, 1994, and somewhat in 1995 and 1996.

The upward pressure from a lower five-year average Farm Credit Service interest rate more than offset the downward pressure from lower five-year average commodity prices, resulting in higher 1995 certified farmland assessed values. For 1996, only certified values for soil productivity index values of 100 and lower increased. Continued upward pressure on calculated values from a lower five-year average mortgage interest rate from the Farm Credit Service for 1997 is expected. This pressure is not expected to be robust enough, however, to counter the relative weaknesses moving into the five-year average price data from the corn and soybean markets. Therefore, 1997 calculated values will be less than 1996 calculated values, and for all except the lower end of the soil quality range, 1997 certified farmland assessed values can be expected to be less than in 1996. The decreases are likely to be 5 percent or less. For assessment year 1998, the pattern of weakening certified farmland assessed values will continue unless there is significant strengthening in commodity prices during the rest of the 1995 calendar year and during 1996.

Figure 6 traces the certified and calculated assessed values for a soil with a productivity index of 120 from assessment year 1981 through assessment year 1996 with some projections through assessment year 1998. Between 1981 and 1986, the certified value was equal to the calculated value. The 1986 10 percent limit law changed this. From 1987 through 1990, the certified value was greater than the calculated value as the limit law restricted the decline from one year to the next to 10 percent. For this soil, the calculated and certified values were identical or very close in 1991 and 1992. Because of stronger commodity prices and lower interest rates, the calculated values in 1993 and in 1994 are above the certified value. The 10 percent limit law was working on the up side, limiting increases from 1992 to 1993 and from 1993 to 1994 to 10 percent.

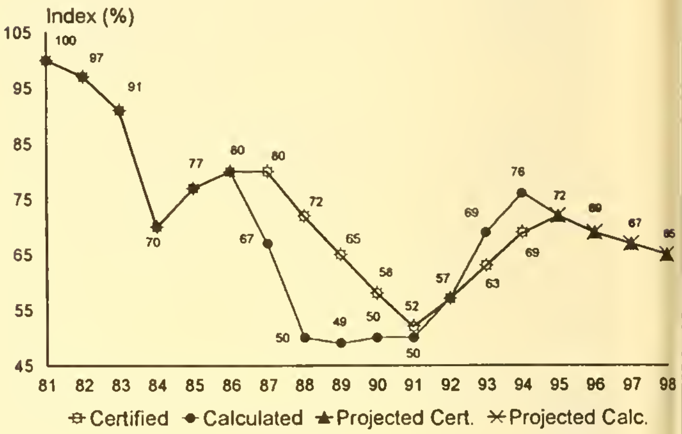

Figure 6. Index of certified and calculated assessed values for soils with a productivity index of 120, 1981 to 1996, with projections for 1997 and 1998.

The calculated and the certified values were identical in 1995 and 1996. The 1995 certified value was up slightly from the 1994 certified value but less than the 1994 calculated value. For 1996, the certified and calculated values are the same and a little lower than the 1995 certified value.

Projections for assessment years 1997 and 1998 show the certified value equaling the calculated value and a slight downward movement in each year from the 1996 value. These projections are based on the expectation that two forces will *not* offset each other, that is, lower five-year average corn and soybean prices and higher five-year average nonland production costs pushing against a lower five-year average interest rate. The projected downward movement in certified values for 1997 and 1998 depends on the negative impact of the lower commodity prices not being offset by the positive impact of lower interest rates. Certified values could move up with a vigorous recovery in commodity prices if there were no offsetting increase in the mortgage interest rate used as the capitalization factor in the use-value formula. If commodity prices do not recover in the next two years or so and if the mortgage interest rate moves up rapidly, there will again be substantial downward pressure on certified farmland assessed values. Under this scenario, certified assessed values would show significant weakness, following the poor performance of the underlying fundamentals of the Illinois farm economy. The 10 percent limit law would likely be in effect. Strengthened commodity prices and no major drop in interest rates would boost certified farmland assessed values. The likelihood of slightly weaker certified farmland assessed values in 1997 and 1998 is reasonably good, given expected changes in five-year average prices and the five-year average interest rate. Keep in mind that the 1997 and 1998 certified values will be the bases for property tax bills paid by farmland owners in 1998 and 1999, respectively.

What About Future Property Tax Bills?

Higher certified assessed values on farmland are welcomed by rural school boards, townships, and county governments and are disturbing to farmland property taxpayers. Weakening farmland assessments in the final years of this century will worry school board members and elected officials in rural local governments.

An increase in certified values does not have to translate into a comparable increase in tax bills. Reduction in farmland assessments does not automatically yield lower farmland property taxes. Only the budgeting process of schools and other local governments will determine the impact of changes in farmland assessed valuations on farmland property tax bills. History suggests property tax bills are extremely sticky downward when assessments are declining and extremely robust upwards when assessments are increasing.

The windfall from rising property tax assessments captured by local governments in Cook County and in the five collar counties of Chicago was the major reason the Illinois General Assembly capped increases in property tax extensions to the rate of inflation or 5 percent—whichever is less—in these six counties. The way local governments in rural Illinois deal with changes in farmland assessments will have a great deal to do with the call for property tax extension caps to be extended to all 102 Illinois counties. Statewide caps have important implications for taxpayers and for the fiscal outlook of the state and local governments. Illinois is very dependent on the property tax to fund schools and local governments. Weakening farmland assessments, which began in 1996 (taxes payable in 1997), suggest that at least for the more rural taxing districts, property tax extension caps would not be a binding constraint and would serve only to increase the cost and complexity of property tax administration.

Taxpayer involvement in the budgeting process of taxing bodies would seem to be prudent in the upcoming budget years. Remember, local government and local school spending financed by property taxes drives the level of property tax bills in a community. The assessment system operating through tax rates simply distributes the cost of this spending among property owners according to the relative assessed valuation of their property.

For four years, the 10 percent limit law held certified assessed values on farmland above the level prescribed by underlying economic conditions. Then, for four years, the certified assessed values for farmland increased, with the 10 percent limit law holding certified assessed values below where they would have been in three out of the four years. 1996 will be a year of transition from past restrictions of the 10 percent limit law to the hard reality of the Illinois agricultural economy. As the 1981 Illinois Farmland Assessment Law intended, the assessed value on farmland, in a general sense, is reflecting the underlying aggregate economic conditions of Illinois agriculture, tempered by the 10 percent limit law, which provides some stability for both taxing districts and farmland property taxpayers.

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FARM ECONOMICS Facts & Opinions

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Illinois Farm Property Taxes Continue to Increase

The average per-acre tax paid on Illinois grain farms from 1976 through 1994, with forecasts through 1996, is presented in Figures 1, 2, and 3. These figures provide an excellent historical view of farm property taxes in Illinois. Figure 4 presents per-acre farm property taxes for each state in the United States for 1993 (the most current data available). These figures make comparisons between Illinois and other states possible. One factor driving farm property tax levels in the Midwest and across the country is the dependence on property taxes to fund local schools. The data in Figure 4 do not reflect the major school-finance reforms recently adopted in Michigan and Wisconsin and the impact of the farm circuit breaker programs in these two states. The farm circuit breakers in Michigan and Wisconsin reduce farm property tax payments below the averages reported.

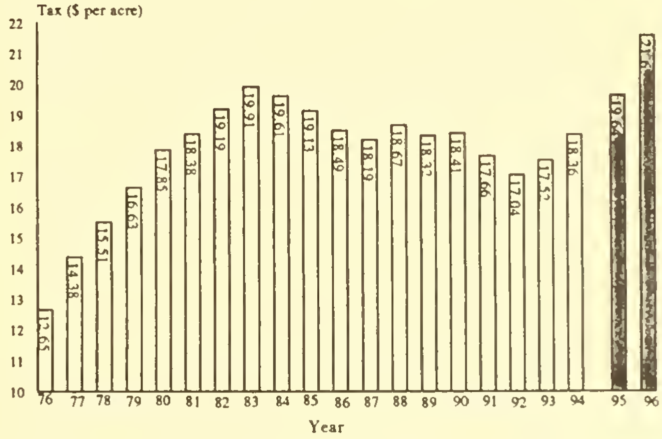

Figure 2. Per-acre property taxes on northern and central Illinois grain farms, 1976 to 1994, with forecasts for 1995 and 1996.

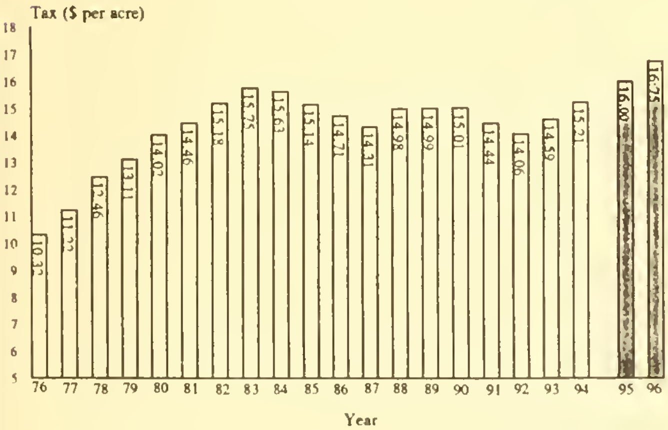

Figure 1. Per-acre property taxes on Illinois grain farms, 1976 to 1994, with forecasts for 1995 and 1996.

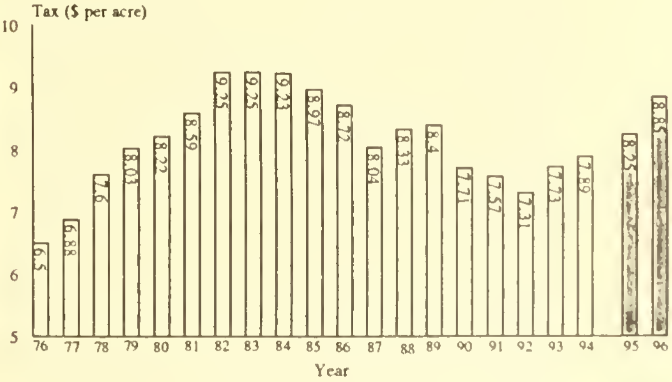

Figure 3. Per-acre property taxes on southern Illinois grain farms, 1976 to 1994, with forecasts for 1995 and 1996.

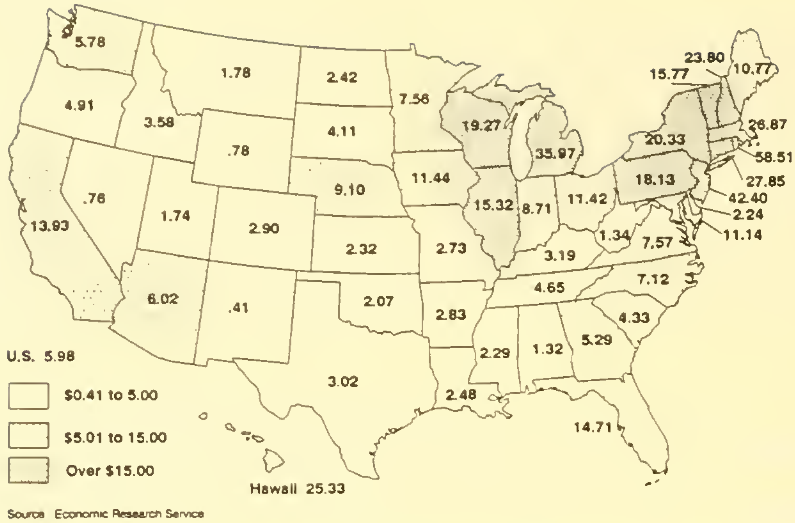

Figure 4. Average per-acre agricultural real estate taxes, 1993.

The average per-acre tax paid on Illinois grain farms was stable in 1988, 1989, and 1990 ($14.98, $14.99, and $15.01, respectively). In 1991 and 1992, the payments were down slightly, $14.44 and $14.06, respectively. The sideways-to-downward movement in average per-acre tax payments reflected declining assessments, which began in 1987, combined with upward pressure on average farmland property tax rates. The weak assessments reflected poor performance by the Illinois farm economy in the 1980s. The average payment in 1993 was up slightly to $14.59 and increased again in 1994 by 4.2% to $15.21 per acre. As the farm economy recovered in the early 1990s, assessments strengthened and without offsetting rate reductions, per-acre payments followed assessments upward.

Stronger assessments in 1994 and 1995 underlie the forecasted increase in average per-acre farm property tax payments to $16.00 in 1995 and $16.75 in 1996. Upward pressure from stronger assessments for all soils is softening, and the 1997 average payments, based on 1996 assessments, will reflect this softening and may even be somewhat lower than the forecasted 1996 payment. These forecasts do not account for any tax rate increases that may be imposed. Higher rates, which are likely in many downstate taxing districts, will put upward pressure on farm property tax payments. These forecasts are underestimates of property tax payments by farmland owners if tax rates increase.

Schools and other taxing bodies, of course, could adopt offsetting reductions in their property tax rates for 1995 and 1996, relax the upward pressure on property taxes, and stabilize nominal payments. Significant pressure from taxpayers would probably be required for this scenario to occur because property tax rates are extremely sticky downward.

Per-Acre Taxes Across the State

Figure 1 shows per-acre property taxes for a sample of Illinois grain farms from 1976 to 1994. Data for the sample in the 68 northern and central Illinois counties and the 34 southern Illinois counties are also included in Figures 2 and 3. In 1994, the sample included 1,902 grain farms, totaling 1.74 million acres. In 1994, average per-acre taxes on southern Illinois grain farms were 52 percent of the state average. Average per-acre taxes on northern and central Illinois grain farms were roughly 120 percent of the state average.

Payments by northern and central Illinois farmland owners increased 4.8 percent from 1993 to 1994. Payments by southern Illinois farmland owners increased 2.1 percent.

The historical difference in the level of per-acre property taxes in the two regions of Illinois reflects the less productive soils in southern Illinois compared to the other regions of the state. Less productive soils result in lower farmland assessed valuations. Generally, farm property tax rates are lower in southern Illinois as well. In 1994, these differences resulted in an average of $18.36 per-acre taxes in northern and central Illinois and $7.89 in southern Illinois. Because the change in assessments in 1993 was similar in the two parts of

Illinois, the higher growth rate in per-acre taxes in northern and central Illinois counties suggests greater increases in property tax rates in these counties compared to southern Illinois counties.

Farm Property Taxes in Illinois and Other States

Figure 4 maps the average per-acre farm property tax payments for the 48 continental states and Hawaii for 1993. Published in 1995, the 1993 data are the most current available to compare the level of farm property taxes in the respective states. The figure for Illinois on the map is a little higher than the 1993 average in Figure 1. The information used by USDA is a survey of a sample of county supervisors of assessments and is calculated from data that includes observations on both livestock and grain farms. As expected, the taxes on livestock buildings result in the USDA per-acre average being slightly higher than the average reported in Figure 1. The University data includes observations on grain farms only.

Per-acre property taxes on farmland are highest in the eastern states. Among the midwestern states, Illinois ranks behind Wisconsin and Michigan in per-acre payments. Both Wisconsin and Michigan have circuit breaker programs for farm property taxpayers in which the state pays a portion of the property tax bill, depending on the taxpayer's income. Accordingly, the figures for these two states are "gross" per-acre taxes unadjusted for that part paid by the state through the circuit breaker program. The "net" or actual average per-acre farm property tax payment is less than the figures in the map.

Illinois has the highest average per-acre farm property tax payments in the United States ($15.32) except for the circuit breaker states of Wisconsin and Michigan, the highly urbanized eastern states, and Hawaii. A major factor determining the level of property taxation in general and the level of farm property taxation in particular is the dependence of local school systems on property taxes as a revenue source. Because Illinois depends rather heavily on the property tax to fund local schools, the relatively high per-acre farm property tax level in Illinois is not surprising. The dependence on the property tax for school funding is a major issue in the ongoing tax reform debate in Illinois.

Effective Tax Rates and Tax Payments

The **effective** property tax rate is the ratio of property taxes paid to the market value of farmland. It is one of the better methods for measuring the property tax burden on Illinois farmland owners. High effective rates indicate a high property tax burden; increasing effective rates indicate an increasing burden. Effective rates for the last 19 years for Illinois and the northern and southern regions of the state are shown in Table 1. The effective rate in 1994 for Illinois was 0.79, down from the 1993 rate of 0.84. This decline reflects an increase in the market price of farmland between 1993 and 1994 that was greater than the increase in property taxes. The declining farm property tax burden, which began in 1988 and continued through 1992, reversed itself in 1993 but appears to be continuing as evidenced by the

Table 1. Effective Property Tax Rates on Illinois Farms, 1976 to 1994

	Effective tax rate (%)[a]		
Tax Year	Northern Illinois	Southern Illinois	Illinois
1976	0.82	0.71	0.79
1977	0.69	0.56	0.65
1978	0.67	0.56	0.64
1979	0.64	0.53	0.60
1980	0.57	0.47	0.54
1981	0.55	0.47	0.53
1982	0.64	0.56	0.62
1983	0.74	0.62	0.71
1984	0.86	0.72	0.82
1985	0.99	0.84	0.95
1986	1.11	0.94	1.07
1987	1.31	0.92	1.20
1988	1.14	0.89	1.08
1989	1.02	0.82	0.97
1990	0.99	0.73	0.94
1991	0.94	0.71	0.89
1992	0.86	0.66	0.82
1993	0.88	0.68	0.84
1994	0.83	0.63	0.79

[a]The effective tax rate is the ratio of property taxes to the market value of farmland, computed in this case using grain farms only.

index for 1994. The strengthened market values on farmland were outpaced by the growth in property tax payments in 1993, resulting in an increase in the Illinois farm property tax burden. The burden increased approximately 2.4 percent from 1992 to 1993. The 5.9 percent decrease in 1994 reflects the strengthened farmland market, not lower property taxes. Whether the burden continues to move downward in the future will depend on the market for farmland. Property tax payments are expected to increase up to 8 or 9 percent in 1995 and 1996. Market values for Illinois farmland are not expected to experience this rate of growth. This may signal a possible increase in the burden of the property tax on farmland in 1995 and 1996 as measured by the effective tax rate.

The lighter line in Figure 5 is an index of average per-acre property tax payments by Illinois grain-farm owners. This line shows the steady increase in per-acre tax payments from 1976 through 1983, a decline from 1983 to 1987, an increase in 1988, roughly a steady state for 1989 through 1990, a decline in 1991 and 1992 and an increase in 1993 and 1994. With strengthened assessments in 1992 and upward pressure from tax rates, the index of property taxes resumed its upward trend in 1993 (1977 = 100). The index of effective tax rates (the dark line in Figure 5) increased in 1993 but decreased in 1994 with stronger farmland market values. The tax burden represented by this measure in 1994 is approximately equal to the burden experienced in 1976 and again in 1983-84, but it is below the record level burden experienced in 1987 (1987 index = 184.2; 1994 index = 121.5).

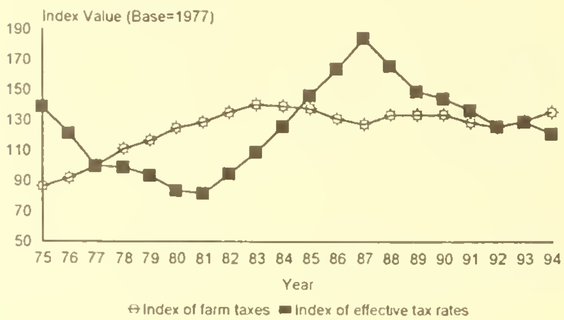

Figure 5. Index of per-acre property taxes and effective farm property tax rates, 1975 to 1994.

Summary

Average per-acre property tax payments on Illinois grain farms increased about 4 percent in 1994 for the second year in a row, reversing a five-year trend of steady or declining average per-acre taxes. Increases in property tax rates combined with higher farmland assessments to push per-acre average payments up. The trend of higher tax payments is expected to continue for taxes paid in 1995 and 1996; 1997 payments may weaken and could be less than 1996 payments, depending on tax-rate changes. The 1996 average per-acre farmland tax is forecast at close to $17.00. This level of taxes would be a historic high.

Comparisons of the effective tax rate and the average per-acre tax payment indicate an increase in "farmland tax burden" in 1993 but a decrease in 1994 as the farmland market strengthened. The farmland tax burden can be expected to increase at least through 1996 or 1997 unless there is extraordinary growth in farmland market values or changes in Illinois tax policies. Heavy reliance on property taxes to fund schools in Illinois will continue to keep per-acre farm property taxes in Illinois the highest in the United States among states with a significant agricultural sector and no farmland circuit breaker.

Learning to understand the dynamics of the Illinois farm property tax is not a trivial undertaking. Future increases in the farm property tax burden will intensify pressures from the agricultural sector for property tax reform. The demands for reform will probablay include ever louder calls for lower dependence on the property tax to finance rural schools and an increased financial role for state government. A sledgehammer policy of property tax caps, now in place in the six counties of the Chicago area, will gain in popular support downstate in the absence of consensus state tax policy alternatives. Shifting the funding for local schools to state government to any great extent requires significant increases in one or both of the state government's major revenue sources—the sales tax and the income tax.

Balancing the Illinois tax system presents a significant challenge to the members of the General Assembly and the governor of Illinois. However, understanding the complexities and dynamics of the farm property tax system will yield significant dividends as current tax policies are assessed and alternatives considered. The task is a major one, but the benefits of a more balanced Illinois state/local tax system will be significant and long lasting. The Governor's Commission on Education Funding, chaired by University of Illinois President Emeritus Stanley Ikenberry, has been charged with making recommendations on how to best reform the Illinois school finance system. Political support of any recommendations is essential if there is to be change. Such recommendations must balance adequate and fair support for the education of all students with property tax relief and the appropriate role of state government in funding local schools—not an easy task!

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FARM ECONOMICS Facts & Opinions

Department of Agricultural Economics • College of Agriculture • University of Illinois at Urbana-Champaign

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Yields and Prices: Correlations and Distributions for Major Illinois Agricultural Commodities

What is the probability that corn prices will exceed $2.85 per bushel? How closely correlated are yields and prices? Does raising hogs help offset variations in income due to changes in corn/soybean yields and prices? Answers to these questions can help farmers, lenders, and other agribusiness firms better understand the opportunities and risks faced by Illinois farmers.

The purpose of this report is to identify and draw implications from the price and yield correlations for the major agricultural commodities produced in Illinois. In addition, this report identifies distributions for prices and yields as determined by a computer program called "*BestFit*." This information can be useful to both producers and agribusiness firms as they evaluate production and marketing risks.

Price/Yield Correlations

Price and yield data for this study were obtained from the 1976 through 1994 editions of the *Illinois Agricultural Statistics, Annual Summary*. These data were used to compute correlations—a measure of the degree of association between two variables. Correlations can take on values between +1 and -1.

Correlations between monthly prices received by farmers in Illinois for the period 1975 through 1993 are shown in Table 1. As expected, the correlations between crop prices are higher than correlations between crop prices and livestock prices. Corn and soybean prices have a strong positive relationship. This outcome is expected because corn and soybeans are grown in the same regions of the state and are exposed to similar growing conditions. Corn and wheat prices also have a strong positive correlation. However, corn and soybean prices are negatively correlated with hog prices. As such, diversified grain-hog farms may face somewhat lower income variations than nondiversified farms, other things being equal.

Price correlations within the livestock sector are highest among beef prices. This relationship is also expected because the prices are for different stages of beef production. The strongest correlation among other livestock prices is between milk prices and steer and heifer prices. The weakest correlations are between beef and hog prices and between hog and milk prices. All correlations among livestock prices were positive.

Price/yield correlations were calculated by comparing the trend-adjusted average annual yield for each crop reporting district with the state season average price received by farmers for the corresponding year (Table 2). Correlation coefficients of trend-adjusted annual yields versus annual prices show the expected negative relationship for corn and soybeans in all crop reporting districts and the state. These negative correlations mean that variations in total revenue are more stable than if there were a zero or positive correlation.

Table 1. Correlation Coefficients of Monthly Prices Received by Farmers in Illinois, 1975-1992

	Corn	Soybeans	Wheat	Steers and heifers	Cows	Calves	Hogs	Milk
Corn	1.00	0.57	0.52	0.00	0.01	-0.21	-0.11	0.13
Soybeans		1.00	0.34	0.10	0.19	-0.01	-0.27	0.11
Wheat			1.00	0.31	0.30	0.10	-0.27	0.41
Steers and heifers				1.00	0.94	0.86	0.17	0.68
Cows					1.00	0.84	0.10	0.65
Calves						1.00	0.08	0.48
Hogs							1.00	0.10
Milk								1.00

Table 2. Correlation Coefficients of Annual Yields Versus Average Annual Price Received by Illinois Farmers, 1975-1993

Yields by crop reporting district	Corn price	Soybean price	Wheat price
Northwest	-0.39	-0.50	0.40
Northeast	-0.36	-0.39	0.34
West	-0.44	-0.62	0.45
Central	-0.57	-0.68	0.39
East	-0.48	-0.46	0.33
West-southwest	-0.60	-0.67	0.49
East-southeast	-0.70	-0.58	0.22
Southwest	-0.57	-0.58	0.43
Southeast	-0.59	-0.69	0.15
State	-0.53	-0.66	0.38

Potential reduction in revenue due to lower yields is offset in part by higher prices. Likewise, very favorable corn and soybean yields lead to lower prices for these commodities.

In contrast, the correlation between wheat yields and wheat prices is positive in all districts and the state. These results are likely due to the low importance of Illinois as a wheat producer relative to the wheat market as a whole. The results do indicate that wheat producers in the state cannot expect high prices in low-yield years nor low prices in high-yield years.

The correlations among trend-adjusted crop yields were calculated both on a statewide basis and within crop reporting districts (Table 3). The correlation of trend-adjusted corn and soybean yields is positive for all regions of the state. As with the price relationships, corn and soybean yields have the highest correlation. Again, this is due to the similar growing regions and growing season of the two crops.

The correlation coefficients for corn-wheat and soybeans-wheat vary widely from region to region. On a statewide basis, there is a very low correlation between corn and wheat yields and between soybean and wheat yields. These correlations are low even in the districts where wheat is a more predominant crop.

Table 3. Correlation Coefficients of Average Annual Trend-Adjusted Yields of Corn, Soybeans, and Wheat Within Illinois Crop Reporting Districts, 1975-1992

Corn reporting district	Corn-Soybean	Corn-Wheat	Soybeans-Wheat
Northwest	0.82	-0.17	-0.07
Northeast	0.83	0.26	0.22
West	0.79	-0.29	-0.47
Central	0.84	-0.08	0.10
East	0.84	0.13	0.30
West-southwest	0.88	-0.11	-0.22
East-southeast	0.86	0.12	-0.02
Southwest	0.81	0.13	-0.17
Southeast	0.82	0.50	0.18
State	0.87	0.07	-0.01

The relationships between the previous year's yield and the current year's price and the relationship between the previous year's price and the current year's price were explored for corn, soybeans, and wheat. However, none of these relationships was found to be significant.

Distributions of Prices and Yields

Distributions of prices and yields provide guidance on the possible range of outcomes and the probability of various outcomes being achieved. While historical distributions can easily be plotted, it is often unclear what functional form best describes a particular historical distribution. However, the functional form and properties of the distribution are important in projecting potential future outcomes.

Analysis of price and yield data was done with the use of a distribution fitting software package known as *BestFit*. The *BestFit* software package finds the probability distribution that is most likely to have generated the data set. *Bestfit* can test 21 different distributions. However, since prices and yields cannot take on values less than zero, only those distributions whose domains were greater than or equal to zero, or greater than or equal to a given lower bound were chosen.

Table 4 contains a summary of the time adjusted cumulative probability distributions and time trends for the price and yield data. To understand the table, consider state corn yields as an example. Based upon the *BestFit* distribution for corn yields, there is a 5 percent probability that the 1995 statewide average corn yield will be 98.1 bushels or less. There is a 50 percent probability it will be 128.9 bushels or less, and a 95 percent probability that it will be 150.3 bushels or less. All other district corn, soybean, and wheat yields can be interpreted in the same manner.

The probability distributions shown in Table 4 are calculated for 1995. However, yields have trended upward over time and the trend coefficient shows how much the yield has increased on an annual basis. To use the table beyond 1995, one can simply add the trend coefficient. For example, there is a 50 percent probability that statewide corn yields in 1996 will be less than or equal to 129.87 (128.9 + .97).

Table 4 also provides estimates of price distributions determined from *BestFit*. Price data were not adjusted for trend because no significant trend was found for the period studied. Using soybeans as an example, it can be seen that there is only a 5 percent probability that soybean prices will be $4.75 per bushel or less. Likewise, there is a 95 percent probability that soybean prices will be less than $7.95 per bushel.

Table 4. Cumulative Probability Distributions for Trend-Adjusted Yield and Prices Less than Stated Amounts

Cumulative probability, %	Corn yields									
	State	Central	East	ESE	NE	NW	SE	SW	West	WSW
5	98.1	101.9	86.0	91.9	95.0	95.8	84.8	83.0	96.7	112.7
10	105.8	110.8	93.8	99.5	102.3	102.5	92.59	0.2	106.0	121.0
15	110.7	116.5	99.9	105.4	107.0	106.9	97.4	94.9	112.3	126.3
20	114.4	120.9	104.9	110.3	110.6	110.1	101.1	98.4	116.9	130.3
25	117.6	124.6	109.5	114.6	113.5	112.9	104.3	101.3	120.8	133.6
30	120.3	127.7	113.6	118.6	116.0	115.1	107.0	103.9	124.2	136.4
35	122.7	130.6	117.3	122.2	118.3	117.3	109.4	106.2	127.3	139.0
40	124.9	133.2	120.8	125.5	120.4	119.2	111.6	108.3	130.2	141.4
45	126.9	135.6	124.0	128.6	122.4	120.9	113.8	110.2	132.9	143.6
50	128.9	138.0	127.1	131.6	124.2	122.6	115.8	112.1	135.4	145.7
55	130.9	140.3	130.1	134.5	126.0	124.3	117.8	114.0	137.9	147.7
60	132.8	142.5	132.9	137.2	127.8	125.9	119.7	115.8	140.4	149.7
65	134.7	144.8	135.5	139.8	129.6	127.6	121.7	117.6	142.9	151.7
70	136.6	147.1	138.2	142.3	131.5	129.2	123.7	119.5	145.4	153.8
75	138.6	149.5	140.6	144.7	133.4	131.0	125.8	121.5	148.1	155.9
80	140.8	152.2	143.1	147.1	135.4	132.8	128.0	123.6	151.0	158.2
85	143.3	155.1	145.5	149.9	137.7	134.9	130.6	125.9	154.2	160.7
90	146.2	158.6	148.3	153.3	140.5	137.4	133.6	128.8	158.1	163.9
95	150.3	163.5	152.0	157.5	144.3	140.9	137.9	132.7	163.6	168.2
Mean	127.2	136.1	124.0	128.9	122.6	121.1	114.2	110.6	133.5	143.8
Standard deviation	16.0	18.9	20.5	20.1	15.1	13.8	16.2	15.2	20.4	17.0
Trend coefficient	0.97	1.14	0.48	1.37	0.39	0.33	1.87	1.70	0.91	2.09

Table 4, continued

Cumulative probability, %	Soybean yields									
	State	Central	East	ESE	NE	NW	SE	SW	West	WSW
5	33.2	36.2	30.9	29.8	34.9	38.0	25.7	24.6	34.8	33.5
10	35.1	38.5	33.5	31.8	36.7	39.6	27.6	26.5	36.6	35.5
15	36.2	39.8	35.1	33.1	37.8	40.6	28.8	27.7	37.7	36.8
20	37.1	40.9	36.3	34.1	38.6	41.4	29.8	28.6	38.6	37.7
25	37.8	41.7	37.4	34.9	39.3	41.9	30.5	29.3	39.3	38.5
30	38.4	42.4	38.3	35.6	39.9	42.5	31.2	29.9	39.9	39.1
35	38.9	43.1	39.1	36.2	40.5	42.9	31.8	30.6	40.4	39.7
40	39.4	43.7	39.8	36.8	40.9	43.3	32.3	31.1	40.9	40.3
45	39.8	44.3	40.5	37.3	41.4	43.7	32.9	31.6	41.3	40.8
50	40.3	44.8	41.1	37.8	41.8	44.1	33.4	32.1	41.8	41.3
55	40.7	45.3	41.8	38.3	42.2	44.4	33.8	32.5	42.2	41.7
60	41.2	45.8	42.4	38.8	42.7	44.8	34.3	33.0	42.6	42.2
65	41.6	46.3	43.0	39.3	43.1	45.1	34.8	33.4	43.0	42.6
70	42.0	46.8	43.7	39.8	43.5	45.5	35.3	33.9	43.4	43.1
75	42.4	47.4	44.4	40.3	43.9	45.8	35.8	34.4	43.8	43.6
80	42.9	47.9	45.1	40.9	44.4	46.2	36.3	34.9	44.3	44.1
85	43.4	48.6	45.9	41.5	44.9	46.6	36.9	35.5	44.8	44.7
90	44.0	49.4	46.9	42.2	45.5	47.1	37.6	36.2	45.4	45.4
95										
	44.9	50.4	48.3	43.3	46.3	47.8	38.6	37.1	46.3	46.4
Mean	39.9	44.3	40.6	37.4	41.4	43.7	32.9	31.6	41.3	40.8
Standard deviation	3.6	4.3	5.3	4.2	3.5	3.0	4.0	3.8	3.5	4.0
Trend coefficient	0.29	0.32	0.17	0.26	0.31	0.31	0.39	0.13	0.33	0.31

Table 4, continued

Cumulative probability, %	Wheat yields									
	State	Central	East	ESE	NE	NW	SE	SW	West	WSW
5	39.1	41.0	43.1	41.5	38.9	38.1	33.8	35.1	36.5	39.9
10	42.3	43.6	46.5	43.5	42.1	41.2	37.0	38.2	40.3	43.5
15	44.3	45.4	48.8	44.9	44.2	43.3	39.1	40.2	42.7	45.7
20	45.8	46.8	50.6	46.1	46.0	45.1	40.7	41.8	44.6	47.5
25	47.1	48.1	52.3	47.1	47.6	46.6	42.0	43.1	46.2	49.0
30	48.2	49.3	53.8	48.0	49.0	48.1	43.2	44.2	47.5	50.2
35	49.1	50.4	55.2	48.8	50.4	49.4	44.2	45.2	48.8	51.4
40	50.0	51.5	56.6	49.6	51.7	50.8	45.2	46.1	49.9	52.4
45	50.9	52.5	58.0	50.4	53.0	52.0	46.1	47.0	51.0	53.4
50	51.7	53.6	59.3	51.2	54.3	53.3	47.0	47.8	52.0	54.4
55	52.5	54.6	60.7	52.0	55.6	54.6	47.8	48.6	53.1	55.3
60	53.3	55.7	62.1	52.8	57.0	56.0	48.7	49.5	54.0	56.2
65	54.1	56.8	63.6	53.7	58.4	57.4	49.5	50.3	55.0	57.1
70	54.8	58.1	65.2	54.6	60.0	58.9	50.4	51.1	56.1	58.1
75	55.7	59.4	66.9	55.6	61.7	60.6	51.3	51.9	57.2	59.0
80	56.6	60.9	69.0	56.7	63.6	62.5	52.2	52.9	58.3	60.1
85	57.6	62.6	71.3	58.0	65.8	64.7	53.3	53.9	59.6	61.3
90	58.8	64.9	74.3	59.7	68.7	67.6	54.6	55.2	61.2	62.7
95	60.4	68.5	79.1	62.3	73.3	72.1	56.5	56.9	63.5	64.7
Mean	51.0	54.0	60.0	51.5	55.0	54.0	46.3	47.2	51.3	53.6
Standard deviation	6.5	8.4	11.0	6.3	10.5	10.4	6.9	6.7	8.2	7.6
Trend coefficient	0.48	0.54	0.58	0.51	0.40	0.31	0.43	0.39	0.47	0.51

Table 4, continued

Cumulative probability, %	Crop and livestock prices							
	Corn	Soybean	Wheat	Feeder calf	Steer and heifer	Cow	Hog	Milk
5	1.74	4.75	2.14	22.36	40.43	23.80	35.80	9.27
10	1.88	5.03	2.41	30.99	45.36	27.08	37.72	10.03
15	1.99	5.22	2.58	37.63	48.63	29.60	39.07	11.52
20	2.08	5.39	2.72	43.22	51.16	31.73	40.18	10.90
25	2.16	5.53	2.83	48.15	53.28	33.60	41.16	11.21
30	2.24	5.66	2.93	52.61	55.15	35.30	42.06	11.47
35	2.30	5.78	3.02	56.71	56.84	36.85	42.90	11.71
40	2.37	5.91	3.11	60.57	58.41	38.31	43.73	11.94
45	2.43	6.02	3.18	64.55	59.90	39.67	44.53	12.14
50	2.48	6.14	3.26	68.71	61.33	40.95	45.35	12.34
55	2.53	6.27	3.34	73.10	62.74	42.18	46.18	12.54
60	2.59	6.39	3.41	77.72	64.13	43.35	47.03	12.73
65	2.65	6.53	3.49	82.65	65.55	44.47	47.93	12.92
70	2.71	6.67	3.56	87.94	67.00	45.55	48.90	13.11
75	2.78	6.83	3.65	93.68	68.52	46.59	49.96	13.32
80	2.85	7.01	3.74	100.06	70.18	47.60	51.18	13.54
85	2.93	7.23	3.84	107.27	72.05	48.65	52.63	13.79
90	3.03	7.51	3.96	115.84	74.32	49.90	54.51	14.08
95	3.16	7.95	4.13	127.00	77.51	51.52	57.44	14.49

By using the price and yield distributions, farmers and agribusiness firms can better assess how current prices and yields compare to expected values. For example, the distributions reveal a probability of just less than 20 percent of hog prices below $40 cwt. Likewise, if a crop farmer is waiting for $8.00 per bushel for beans and $3.50 per bushel for corn, there is a very low probability of obtaining such prices. These price and yield distributions also provide important insights in doing sensitivity analysis or when comparing alternative budgets and production plans.

Summary

The correlations and distributions for the prices and yields described in this report help characterize production and marketing risks for Illinois agricultural producers. The shape of these distributions and the relationships between them directly affect the overall risks faced by producers. These results are also useful in stochastic budgeting. For example, in his master's thesis, Vidourek incorporated the aforementioned price and yield distributions into a Lotus program to estimate the probability distributions of net farm income for typical farming operations in Illinois.[1]

The information is also useful in considering marketing decisions. For example, at the time of this writing, corn prices were near $2.85 per bushel. Historically, corn prices have been lower than that level 80 percent of the time. Such information can help in judging the likelihood of prices remaining at that level for extended periods of time.

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[1]Vidourek, Mark S. "Stochastic Farm Level Budgeting." M.S. thesis. Department of Agricultural Economics. University of Illinois, April 1995.

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Electronic System Delivers Communication, Information to Soybean Industry

Reports, information, newsletters, and historical market data broadly related to soybeans now are gathered in a one-stop spot on the Internet: StratSoy. StratSoy is a state-of-the-art, electronic information and communication system on the World Wide Web (URL: http://stratsoy.ag.uiuc.edu/stratsoy.html).

StratSoy takes advantage of the newest communication technologies to offer instant access to resources from around the world. From StratSoy, users can find links to such market information and reports as: Weekly Outlook Report, University of Illinois and Purdue University; a variety of United States Department of Agriculture reports; Economic Research Service Situation and Outlook Reports; the 1995 Soy Stats Reference Guide; Pink Sheet Commodity Price Data; and National Trade Databank.

StratSoy also provides a two-way communication system to help producers, soybean industry leaders, and the public stay in touch and abreast of important developments in agriculture.

The StratSoy system was developed by Sarahelen Thompson, Steven Sonka, and Darrel Good, in the University of Illinois Department of Agricultural and Consumer Economics, as a way to help the nation's soybean associations increase the coordination, efficiency, and profitability of the U.S. soybean industry. The associations communicate, monitor, sort, assimilate, and analyze vast amounts of information related to soybean production, markets, and utilization. They are responsible for making strategic allocation of check-off dollars. Better coordination and streamlining of the decision support systems across users and decision makers are critical steps toward making the soybean industry more competitive.

Pilot Tested

StratSoy was implemented in fall 1994 as a pilot project. State soybean association offices and farmer board members in Illinois, Indiana, and Iowa, along with United Soybean Board and American Soybean Association offices, were provided a connection to StratSoy. StratSoy carried a limited amount of information and links compared to today, yet in the pilot project phase it attracted the attention of not only soybean associations, but also farmers, university researchers, private industry, and government officials and proved its usefulness as an information and communication tool.

http://stratsoy.ag.uiuc.edu/stratsoy.html

Today, StratSoy is funded in part by a grant from the United Soybean Board, which has allocated check-off dollars to carry out Phase I of the project through 1996. This includes development of information, communication, research database, and outreach components. The UI Cooperative Extension Service Office of Computer Coordination is building and maintaining the StratSoy home page. The Texas A&M University Agricultural Market Research Center is building the research database.

Although StratSoy is being developed for the soybean industry, anyone with a connection to the Internet can get to the StratSoy home page by entering the URL or Internet address, http://stratsoy.ag.uiuc.edu/stratsoy.html. The StratSoy computer team suggests those thinking about getting connected to the Internet have, at minimum, a computer with: an Intel 80386, 80486, or Pentium microprocessor; 33Mhz or greater clock speed; 8Mb of RAM; 10Mb of free disk space; a mouse; and a video card with 1Mb of RAM. Users also need software, such as Microsoft Windows v3.1 or Spry Internet in a Box v2.0; a fast modem, 14.4 v.32bis or 28.8 v.34; and access to an analog phone line. Finally, new users must arrange an account with an Internet service provider, a business which connects users to the Internet. Internet service providers can be found through Internet magazines or local newspapers and computer or electronic stores.

Information

The StratSoy home page is a work in progress, changing weekly. Today, users can find information about events and news from soybean offices around the country. Timely soybean forecast and simulation models, as well as soybean market information, are available from StratSoy. Links to universities, libraries, government, and other resources around the world deliver the most current weather, production, marketing, and research information to StratSoy users. An interactive "Ask the Experts" service allows users to e-mail questions to specialists in areas ranging from production to utilization to human health.

More than 3,000 users visit StratSoy monthly, and the number continues to grow. The StratSoy team invites discussion and feedback from all users to ensure StratSoy meets their needs.

Communication

Computer specialists with the StratSoy project are visiting every soybean organization office to connect users to the Internet. They provide training on use of electronic mail and the Internet not only to these offices, but also to their clients during a "marketing" day. To facilitate communication with important clients and audiences, each office has an area on the StratSoy system for information about their office and activities.

Soybean Research Database

The Soybean Research Database is a tool for development, coordination, and integration of check-off funded research activities. Features of the database will allow users to organize, search, and retrieve research information. Over time, the database will provide a framework for monitoring the progress of existing research projects and for considering new research proposals. It is intended to help soybean organizations minimize unnecessary duplication of research, identify needed research activities, and obtain information for marketing of research findings.

Communications Outreach

The StratSoy team demonstrates StratSoy to the soybean industry and potential users as part of the United Soybean Board's goal to facilitate coordination for all segments of production, technology, research, and utilization. In addition to soybean associations, audiences have included congressional aides, farmers, researchers, UI faculty and advisory boards, agribusiness, media, and the public.

For more information about StratSoy, contact project leader Sarahelen (Sally) Thompson, 217/244-4232, Internet: sallyt@aes.ag.uiuc.edu; or communications officer Tina Prow, 217/244-4602, Internet: t-prow@uiuc.edu.

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