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Why Families Invest in Education

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Abstract

This paper develops the theory of family saving and investment decisions and analyzes of the influences on the amounts saved and invested by families in education over the family life cycle. The hypothesis suggested by the theory are tested using three stage least squares simulataneous equation methods with microeconomic data collected in a nationwide survey from both students and their parents specifically for this purpose.

The model builds upon Becker's model of family decision processes (1981, Ch. 6). Each person is assumed to live for two generations, with parents interested in the future welfare of their children. Imperfect capital markets are assumed, however, for loans that are to be used for purposes of investment in human capital.

The results indicate that families therefore do resort primarily to internal sources of funds, or family disposable income and wealth, augmented by subsidized guaranteed loans and tuition waivers. These are found to be the three most significant exogenous determinants of the net amount of additional education planned. As sources of differences in opportunities for education, they are each more important than ability, mother's education, (each of which do have some effect), or other sources of differences in capacities in determining the amount of education obtained, and hence earnings later.

Why Families Invest in Education

Walter W. McMahon*

This paper develops the theory of investment by families in the education of their children and in financial assets over the life cycle. It tests hypotheses implied by this analysis of family saving and investment decisions about the influence of individual capacities and related factors on the investment demand for education, and about the influences on educational opportunities from internal family sources and external sources of funds. The tests involve simultaneous equation estimates using microeconomic data collected in a nationwide survey from both students and their parents specifically for this purpose.

The implications of the results of such an analysis of family saving, investment, and human and financial capital bequest behavior include revealing some of the underlying sources of inequality in the distribution of income. This is so because although there are wide differences in property income among households, if these are put to the side, considerable differences in earnings remain. The latter are closely related to differences in the amount of education obtained. The underlying causes of differences in the amount of education received therefore are also sources of inequality in earnings, and hence also help to explain the intergenerational transmission of inequality.

The model of family decisions developed in Part I involves a joint solution for consumption, investment in human capital, and labor supply along the lines developed by Heckman (1976). As in Becker

(1981, Ch. 6), however, the model is one of family investment decisions, where each person is assumed to live for two generations. Part I extends Becker's model so that the utility function of the parents is a function of their own consumption and of the adult consumption of their children in the next generation, including both the expected monetary and non-monetary returns from any investment in education. It also assumes imperfect capital markets, since they are more relevant to the type of investment decision analyzed. The model focuses on the amount of planned investment in college education, that is, 0, 2, 4, 5, or more years, as well as the quality of the education planned, rather than on the decision to go or not to go to college. Although the theory also is relevant to family educational decisions at earlier levels, or even on-the-job, the model and the data in Part II deal primarily with the college investment decision because it is at this stage where there is the largest variation among families in the U.S., and hence the largest impact on earnings later.

The data is from a nationwide survey conducted by the author with NIE support. It contains information on expected earnings, expected non-monetary returns, foregone earnings costs, tuition, and actual scholarships, grants, and student loan aid received. The survey is also unique in obtaining information on disposable income and wealth directly from the parents rather than from the students, and in calculating the implicit expected rates of return from education by iterative methods on the computer for each student.

It is made possible by household production of human capital. The amount invested by the family in real terms, I_t, is the result of purchases of schooling D_t and the investment of time in studying $(s_{1t}H_t)$:

$$(2) \qquad I_t = I(D_t, s_{1t}H_t), \qquad t = T, \ldots, L$$

H_t = the family's existing stock of human capital, and s_{1t} = the fraction of time that this stock is devoted to schooling, or to human capital production. This time invested is largely that of the student, valued by the family in terms of the earnings foregone which are not available therefore to pay the young person's maintenance costs. As this investment in further education occurs, the existing stock of human capital continues to accumulate:

$$(3) \qquad H_t = H_{t-1} + I_t - \sigma H_{t-1}$$

where σ = a rate of depreciation and obsolescence.

But "full income" in the future is also increased by the non-monetary returns expected from education during leisure time hours after graduation and upon retirement. These arise because of the second form of household production, the production of final consumption satisfactions. This process uses the stock of human capital existing at that time, H_t, for some fraction of time, s_{2t}, spent in leisure or retirement:

$$(4) \qquad Z_t = Z(X_t, s_{2t}H_t) \qquad t = T, \ldots, L$$

where X_t = market-produced consumption goods. It is reasonable that if human capital is productive during working hours, it also can increase the efficiency with which time is used during non-market hours. This increased efficiency yields non-monetary returns.

To obtain the investment opportunities locus illustrated in Figure 1, both forms of household production specified above are substituted into a standard (financial) budget constraint. When combined with a time constraint that merely says that the fraction of time spent producing human capital, in consumption, and spent working must add to unity, the result is "full income" as illustrated along the investment opportunities locus.

Investment in Financial Assets vs. in Education

The rate of return to investment in financial assets is illustrated by the slope of the line $Y_T Y_1'$ in Figure 1. The total rate of return to investment in education is considerably larger for the initial levels of investment from Y_T to A. But it diminishes as the family increases its investment further and further, due largely to the fact that the foregone earnings costs get larger as the child gets older. Lower income families will invest only in education, since the rate of return is so much higher. But higher income families will invest in education up to the optimal point B, at which time the rate of return to investing in financial assets becomes more attractive. In the latter case, bequests are made not only in the form of providing the children with a good education, but also in the form of other property or financial assets.

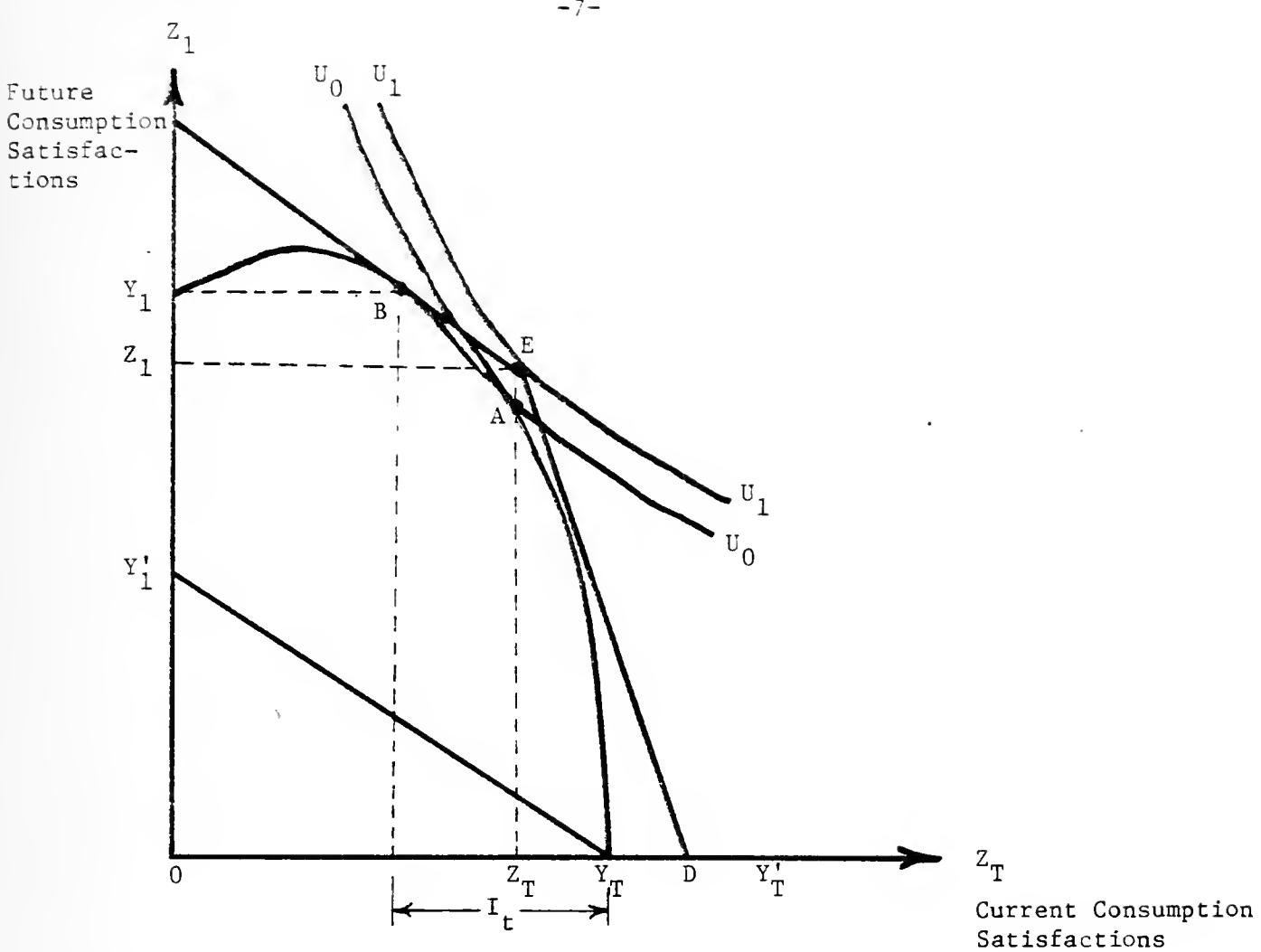

Figure 1. An Analysis of Family Saving and Investment Decisions

Imperfect Capital Markets

Lenders are reluctant to lend to students for purposes of human capital formation where the risk associated with the student's future earning capacity is hard to appraise and the collateral is poor. Lazear (1980) finds that the loan rates available to low income families are only slightly higher. But both high and low income families may be reluctant to borrow any of the large sums needed at market rates to replace foregone earnings, and there may also be credit rationing given the nature of the collateral.

It is reasonable to assume that the market interest rates for non-guaranteed, non-subsidized, student loans (slope AD) are much higher than for subsidized student loans, which is consistent with the fact that most human capital formation is financed out of the family's income and internal sources of funds, and not primarily by borrowing.

However, should a Federally-guaranteed student loan in the amount BE in Figure 1 be available to the middle or lower income family who satisfies a means test, the lower subsidized rate (slope of BE) enables the family to attain a higher level of satisfaction (at E) while also investing more (from A to B). Beyond point E the higher non-subsidized non-guaranteed rate charged by private capital markets (shown by the steeper slope of line ED) does not make further borrowing advantageous.

Optimal Investment in Education

If the family maximizes its satisfaction over its life cycle subject to the multiperod investment opportunities constraint, the result is a joint solution for the family's investment in education, saving, consumption, and labor supply. That is, the multiperiod utility function (Eq. (1)) is maximized, subject to the constraints imposed by household production of satisfaction (Eq. (2)), household production of education (Eq. (3)), the financial budget constraint, and the time constraint. Then the first order conditions can be solved simultaneously for I_t, the planned investment in education. This solution includes a solution for saving ($Y_T - Z_T$ in Figure 1), borrowing, ($I_t - [Y_T - Z_T]$), consumption (OZ_T and OZ_1), the family labor supply (Y_T less the foregone earnings), and future income (OY_1).

This joint solution is analagous to that developed by Heckman (1976), except that since each family here lives two generations, parental income and wealth at Y_T is predetermined. A family with higher parental income and wealth would have investment opportunities that begin further out, (say at Y_T'), and could invest more, leading to higher earnings in the future. Our model differs from Heckman's as well by assuming imperfect capital markets, the reason for guaranteed student loans. Parental income and imperfect capital markets cause education to be financed overwhelmingly via tax-supported public schools and out of the family's internal source of funds. This causes both the amount of support for public education, which is affected by the average income of the taxing jurisdiction, and the family's income directly, to influence the amount of post secondary education obtained.

II. Hypothesis Tests and the Data

Since very long term investment decisions by the family are involved, returns during future periods throughout the life cycle are best discounted back to their present value and related to costs through computation of an internal rate of return relevant to the investment decision to be made by the family. This can be illustrated by comparing Figure 1 above to Figure 2 below. In Figure 1, the expected rate of return is given by the slope of the investment opportunities locus, whereas in Figure 2 it is given by the height of investment demand function. The rate of return is higher at lower levels of investment in education, but gradually diminishes as point B is approached as the amount of investment increases. This decline

reflects rising marginal costs and a shortening period during which returns can be earned, the former due largely to rising foregone earnings costs at each successively higher level of education which has been developed by Ben Porath's model (1967). When the optimal level of investment is reached at point B, the expected rate of return from the demand-side (as given by the slope of $Y_T B$ in Figure 1 and the level of D_1D_1 in Figure 2) is just equal to the rate of interest in the supply-of-funds side (as given by the slope of the line BE in Figure 1 and the level of the supply-of-funds function S_1S_1 in Figure 2).

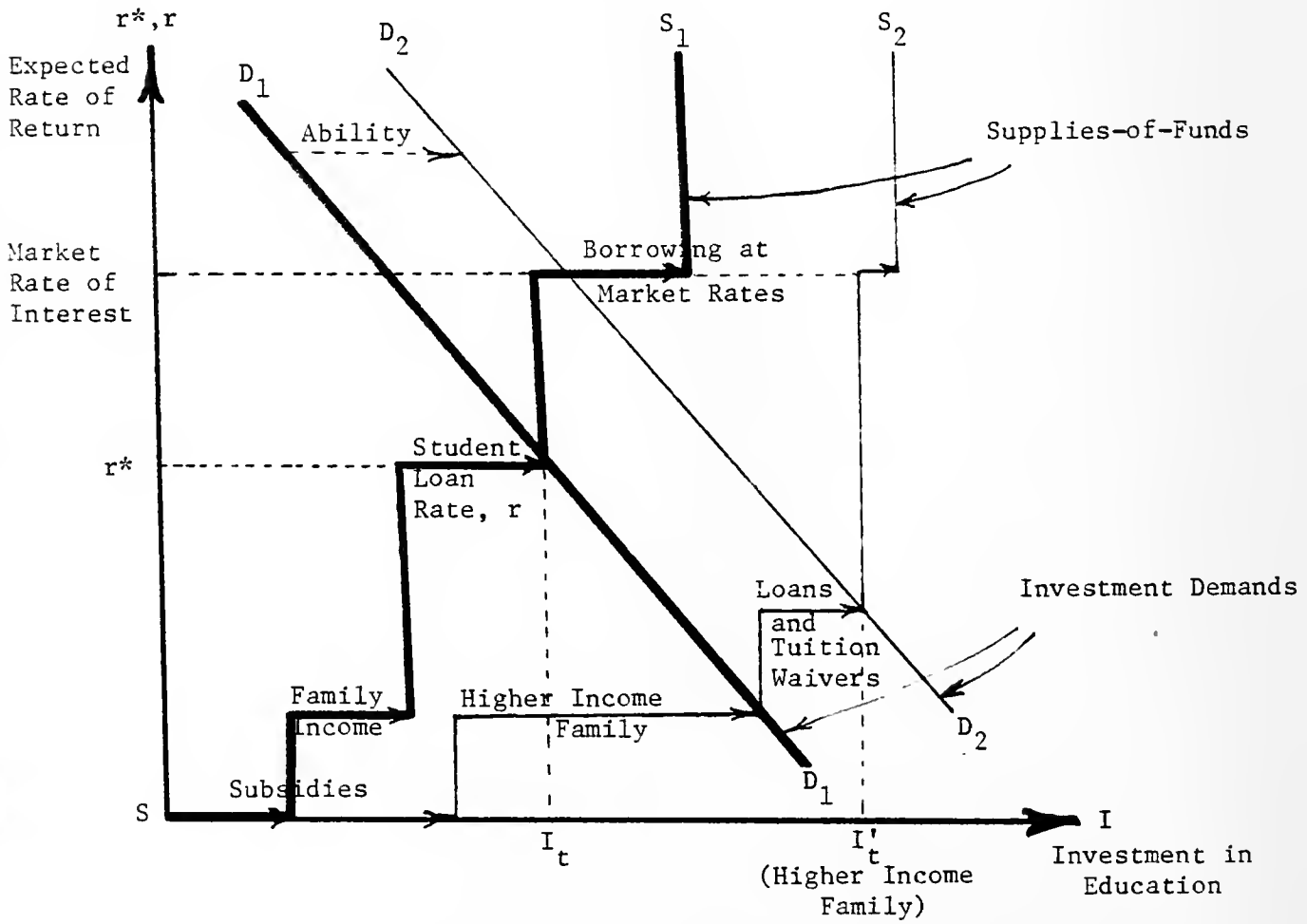

Figure 2. Investment Demand and Suppliers-of-Funds Determining Investment by Lower and Higher Income Families

The supply of funds reflects cheaper internal sources of funds and subsidized tuition and loans typical of imperfect capital markets. An optimal amount of investment at point B in Figure 1 corresponding to B in Figure 2 occurs where the expected rate of return just equals the effective rate of interest.

Measurement of Each Variable in the Survey Data

The survey data which is described later below yields measures of each of the variables in the model. The endogenous variables for investment-demand derived as described above and for the supply-of-funds coming from the family budget constraint are the amount of planned investment I, the expected rate of return, r*, and the cost of funds, r, with the latter two equal for consumer equilibrium. All the other variables either shift the investment demand function, DD, or the supply funds function, SS, illustrated for both a low and a high income family in Figure 2.

Investment demand, with an explanation of how each variable is measured, is:

$$(4) \qquad I = I(r^*, A, S_M, S_F, \mu, N_1, \ldots, N_6)$$

I = planned investment in college. The number of years of education planned by the student and his family (e.g., 2 year Associate degree, Bachelors, Masters, M.D., Ph.D., etc.) was multiplied by the expected costs per year. The latter were the sum of tuition and fees, reduced by the tax-subsidies and endowment fund subsidies to tuition, scholarships, and foregone earnings costs.

r* = the expected rate of return. A pure internal rate of return to the planned degree program computed for each student by iterative methods. It equates the student's expected earnings over his or her life cycle (analyzed in McMahon and Wagner, 1981) to the family's total

private investment costs as defined above by I. This is a private expected rate of return of the type relevant to private household investment decisions, which is developed further in McMahon (1983).

A = ability, as measured by the ACT Composite test score used for college admissions. Greater ability could be expected to increase the expected rate of return and hence shift the demand function upward as among different families.

S_M = schooling of the mother. The hypothesis is that home investments in children, when the mother has more education, both raises the I.Q. or ability of the child (see Liebowitz, 1974) and also, especially if the mother has been to college, shifts the utility function toward greater farsightedness. Both imply larger investment in education.

S_F = schooling of the father, analogous to S_M.

μ = degree of uncertainty. This was measured by asking the student to estimate his or her degree of uncertainty about future earnings on a scale from 0 to 1.

$N_1, \ldots, N_6$ = expected non-monetary returns from education. The contributing of education to greater efficiency in household production of satisfactions, defined in more detail when relevant later below.

The expected rates of return at each higher level of education are shown by the downward-sloping investment demand function in Figure 2, with the other terms representing differences among families that shift the function.

The supply-of-funds, which recognizes that the parents forego the student's earnings as they support the student's room and board out of their disposable income, is given by:

(5) $\quad I = r(r, Y, S, L, B, W, 0).$

r = the rate of interest on student loans. In the rare instance that the family borrows in the non-subsidized non-guaranteed loan market to support human capital formation, r is the market rate of interest available to them (see Lazear 1980).

Y = family disposable income, including earnings of the student, collected from parents and students separately in the survey.

S = tax-subsidies and endowment fund subsidies to tuition, plus scholarship aid received from all sources.

L = student loans. The amount available to middle or lower income families, based on a means test, guaranteed by the Federal government, and available at a subsidized rate.

B = the number of bothers and sisters at home or in school. This is a limiting factor on the availability of family financial support.

W = work-time spent in the market by the student, withdrawn from hours of study or leisure.

O = Order of birth. A dummy variable, equal to one if the student is first-born. The hypothesis is that the first born male in some families (especially black families) is expected to help support the family, so that foregone earnings are less available for the support of further education.

Equation (5) above defines the supply of funds schedule which is illustrated in Figure 2. A nearly vertical supply-of-funds schedule (anticipating some of the results reported below) is shifted horizontally, since investment is measured on the horizontal axis, by public and family sources of support for education. The equilibrium condition for equilibrium of the consumer is

(6) $$r^* = r,$$

so that the endogenous variables are I, r*, and r.

The Data

The survey data analyzed below is the first 1,863 cases from a nationwide survey conducted by the author of families who have at least one child of college age who had taken the ACT Assessment in high school. The respondents were also applicants for financial aid, although all did not receive aid. These applicants, it turns out,

are reasonably representative of all students since most prospective students apply for possible tuition waivers or scholarships. The group includes those applying to higher tuition private schools, those who did not receive aid, and those who chose not to attend. The non-college oriented high school students who did not take the ACT test in their junior year in high school are under-represented, although the sample does contain a number who by age 19 had not enrolled in any college. Those who did enroll were re-weighted to be representative of all college students as given by the ACE national freshmen norms. The weights needed were small, suggesting that the sample was quite representative to start with, as between the proportion enrolled in public vs. private institutions, as among the proportion in universities, 4-year, and 2-year institutions, as among the proportion at each SES level, and as between male and female. (See McMahon and Geske, 1983, Chapter 7, for these weights and for further references on the details of the survey.)

The survey had a relatively high 80 percent response rate for matching responses from both parents and students. It yielded very specific information copied by the parents from specific lines on their income tax forms, and for which they gave signed authorization for verification, on their family income and assets. The prospective student provided information later on the aid actually received and tuition paid, which was linked to American Council on Education information on the extent to which tuitions were subsidized by tax sources and endowment funds. From the 1,863 cases, nonwhites were eliminated in order to focus on the decisions made by the 746 families containing

white males and 602 families containing white females considered below.

To compute the expected rate of return (see McMahon, 1983, for the formula and procedures used), the foregone earnings costs were assumed for those in college to be the earnings of a high school graduate of the same race and sex as given by Census data. The foregone earnings costs for a more advanced student were assumed to be the earnings of a college student with the next lower degree of the same age, race, and sex, thereby reflecting rising foregone earnings costs at each level. The model is tested separately for men and women students both because there may be some differences in their expected earnings and to determine if there are significant differences in the relative influence of expected monetary and non-monetary returns.

III. Econometric Results

The significance of each of the influences discussed above on the planned investment by the family in post-secondary education may be seen by examining the signs indicating the direction of each effect and the significance of each variable in the three stage least squares estimates of the demand and supply functions shown in Table 1 below.

All of the coefficients have signs suggested by the theory except for some effects from expected non-monetary returns, most of which are insignificant. This rather remarkable correspondence of the signs consistent with the hypothesis derived from the analysis of planned investment over a family's life cycle holds for the supply equations as well as the demand equations, and for both males and females considered separately.

The Expected Rate of Return

The expected rate of return has a negative relation to the amount of the investment planned, as expected--a downward sloping investment demand function at each higher level of education after controlling for sources of other differences in expected returns among families. This effect reflecting rising foregone earnings costs is highly significant ($t = 14.92$ for males and $t = 6.71$ for females).

An equilibrium exists, and is stable (in the static sense), since when estimated by three stage least squares methods, the investment demand function is cut by the supply-of-funds function from below. The latter is almost vertical. For males, for example, in Table 1, $\partial r^*/\partial I = -1/62 = -.016$, since r^* and I must be interchanged to find the slope in the form in which it is illustrated in Figure 2. On the supply side, $\partial r/\partial I = 1/4.44 = -.225$, or a multiple of 14 times "steeper" than the demand function in the dimensions illustrated in Figure 2. At lower expected rates of return, associated with more advanced degrees, the demand for investment funds exceeds the amount that the family and other sources are willing to provide. So sons and daughters do not become perpetual students, and a stable equilibrium is assured, as the investment plan is cut back to levels where the expected rate of return is higher and the contemplated investment can be financed.

Ability and Stocks of Human Capital

Other factors on the demand side shift the investment-demand curve, raising the expected rate of return, and making a larger amount of investment advantageous either by planning to go farther, choosing

Table 1

Determinants of Investment in Education By Families
(Three Stage Least Squares; t-Statistics in Parentheses)

Males (Whites only)

Demand: $I_t = \underset{(14.92)}{-.62r^*} + \underset{(.48)}{.04A} + \underset{(3.49)}{2.66S_M} + \underset{(1.26)}{.97S_F} - \underset{(1.36)}{2.36\mu} - \underset{(1.31)}{1.06N_1} - \underset{(2.21)}{2.55N_2}$

$+ \underset{(.82)}{.90N_3} - \underset{(2.07)}{3.45N_4} - \underset{(1.74)}{1.60N_5} - \underset{(3.97)}{4.13N_6} + \underset{(4.57)}{3.74N_7} + \underset{(11.65)}{.30}$

Supply of Resources: $I_t = \underset{(6.27)}{-4.44_r} + \underset{(21.82)}{.43Y} + \underset{(6.42)}{.004S} + \underset{(23.18)}{.62L} - \underset{(4.62)}{.25B} - \underset{(45.41)}{.73W} - \underset{(10.97)}{.13}\ 0 + \underset{(22.33}{.27}$

Females (Whites only)

Demand: $L_t = \underset{(6.71)}{-.19r} + \underset{(4.42)}{.19A} + \underset{(1.21)}{.47S_M} + \underset{(.74)}{.29S_F} - \underset{(1.52)}{1.19\mu} - \underset{(.42)}{.18N_1} + \underset{(2.07)}{1.24N_2}$

$- \underset{(1.02)}{.57N_3} - \underset{(.83)}{.89N_4} + \underset{(.74)}{.51N_5} - \underset{(2.62)}{1.12N_6} + \underset{(2.30)}{.97N_7} + \underset{(6.15)}{.11}$

Supply: $I_t = \underset{(5.57)}{-2.01r} + \underset{(21.79)}{.25Y} + \underset{(20.35)}{.005S} + \underset{(20.08)}{.37L} - \underset{(5.71)}{.16B} - \underset{(31.47)}{.62W} + \underset{(2.79)}{1.93}\ 0 + \underset{(10.79}{7.54}$

a better quality institution, or both. Ability is a key factor that might be expected to raise the expected rate of return, and hence investment demand. This is so since students with greater ability can learn more quickly, reducing learning costs in school as well as on-the-job later, and thereby lead to higher expected earnings.

But ability (A) as measured by the ACT composite test score is not a significant determinant of the amount of investment planned by males, as can be seen in Table 1. It is more significant for females ($t = 4.42$). But the education of the mother S_M is significant for

males, a factor that Leibowitz (1974) and Benson (in McMahon and Geske, 1982, p. 73) have shown to be highly related to the child's IQ and to school achievement respectively. Ability furthermore is more highly correlated with the mother's education as shown in Table 2 than it is with any other variable in this study. The father's education is a much less significant factor (consistent with the findings of others), especially when the family disposable income which is related to the father's education is taken into account.

The standardized regression coefficients are shown in Table 3, indicating the relative importance of ability and parents education in relation to the other influences on the amount invested. Ability alone explains only 1 to 10 percent for males and females respectively of the variation in investment due to shifts in demand and supply--less in fact than most of the elements affecting the supplies of funds and hence educational opportunities. Taking the three factors relating to ability together (namely A, S_M, and S, since the mother's education reflects home investment in children and tuition waivers are also correlated with ability as seen in Table 2), these factors together account for only 14 to 26 percent of the differences in the amount invested in education.

Uncertainty

If the student has a greater degree of uncertainty (μ in Table 1) about his or her expected future earnings after graduation, the planned investment in education is smaller, as might be expected. But this is not a significant factor, as indicated by the t-statistics

Table 2. Zero-Order Correlation Matrix

2a) Investment-Demand Equation

	I	r*	A	S_M	S_F	μ	N_1	N_2	N_3	N_4	N_5	N_6	N_7
I	1.00	-.52	.13	.14	.14	.16	.08	.12	.01	.14	.09	-.07	.23
r*		1.00	-.06	.06	.02	-.08	-.08	-.18	-.03	-.15	-.10	-.07	-.09
A			1.00	.21	-.06	.20	.10	.14	.00	.14	.05	-.07	.09
S_M				1.00	.45	.09	-.05	.00	-.07	.07	.10	-.09	.09
S_F					1.00	.20	.03	.07	.08	.07	.06	-.11	.17
μ						1.00	.07	-.03	.06	-.02	.03	-.06	.21
N_1							1.00	.27	.04	.02	.05	-.05	.16
N_2								1.00	.08	.22	.17	.08	.08
N_3									1.00	.48	.03	.09	.15
N_4										1.00	.10	.02	.10
N_5											1.00	.16	.25
N_6												1.00	.41
N_7													1.00

2b) Supply-of-Funds Equation

	I	Y	S	L	B	W	O	A	S_M	S_F
I	1.00	.13	.07	.28	.07	-.57	-.16	.13	.14	.15
Y		1.00	.09	-.15	.40	.09	-.01	.20	.35	.35
S			1.00	.09	-.02	-.04	.03	.13	-.04	-.03
L				1.00	-.05	-.07	-.10	-.05	-.15	-.12
B					1.00	-.08	.02	.13	.21	.28
W						1.00	.03	.01	-.10	-.11
O							1.00	-.00	-.10	.07

below the .05 level in Table 1 and the very small beta coefficients for μ in Table 3.

The degree of uncertainty about earnings is positively related, however, to whether the student thinks he can find a suitable spouse (N_7, Table 2a), and is somewhat higher for high ability students who might anticipate a wider range of options. But although other analyses were conducted on this variable (not reported here), the prior conclusion stands--namely, that μ has a relatively insignifcant influence on investment.

Expected Non-Monetary Returns

In general, most of the non-monetary returns expected from further education that were tried turned out to be insignificant. The negative coefficients taken on by certain of the others suggested that those who are strongly oriented toward the non-monetary satisfactions may seek to realize some of these by stopping school sooner.

Insignificant effects were found on investment by both males and females from expected non-monetary job satisfactions N_1, better health and home guidance for future children N_3, and opportunities after graduation to continue to meet interesting people N_5. Males saw no educational value in a stimulated interest later in life in reading and new ideas N_2, in contrast to females, or in learning to be more broadminded N_4. Neither males nor females valued college as a means of finding a spouse with good financial prospects N_6, whereas both valued it for finding a spouse with "college developed values" N_7.

Table 3

Relative Importance of
Difference in Capacities (Demands) versus
Differences in Opportunities (Supplies-of-Funds)

Differences in Capacities, or Demands:			Betas		Percent of Total Shifts Explained	
			Males	Females	Males	Females
Ability		A	.020	.158	1%	10%
Mother's Education		S_M	.143	.044	9%	3%
Father's Education		S_F	.052	.056	3%	3%
Greater Uncertainty of Earnings		μ	.051	.051	3%	3%
Finding Prosperous Spouse	(-)	N_6	.160	.105	10%	7%
Finding Educated Spouse		N_7	.052	.094	3%	6%
Sum of Above					29%	34%
Slope of Demand Curve	(-)	r*	1.04	.542		
Differences in Opportunities, or Supplies:			**Males**	**Females**	**Males**	**Females**
Family Income		Y	.259	.216	16%	15%
Subsidies (Taxes, Scholarships)		S	.074	.204	4%	13%
Loans		L	.246	.193	15%	13%
Number of Siblings	(-)	B	.053	.056	3%	4%
Work-Time	(-)	W	.539	.319	33%	21%
First Born	(-)	O	.001	.000	0%	0%
Sum of Above					71%	66%
Slope of Supply Curve	(-)	r	.074	.057		

This relative insignificance of expected non-monetary returns would not appear to be inconsistent with the findings of other studies. Michael (in McMahon and Geske, 1982, pp. 119-49), for example, finds several positive contributions to the efficiency of home production from education that are along the lines of those mentioned above. But students may not value them highly as reasons for going to college. Astin (1983) has found that being able to make more money is increasingly given by students as a "very important" reason for going to college (by 69.8% in 1982), whereas goals related to externalities such as helping to promote racial understanding or to developing a meaningful philosophy were rated as important by only 30.7 percent and 46.7 percent respectively.

Difference in Opportunities

The family's disposable income, Y, has a very importnt influence on the amount invested. It is a highly significant determinant for both males and females ($t = 21.82$ and $t = 21.79$ respectively in Table 1). It is the most important single determinant except for the time withdrawn from study for work, as indicated by the betas of .259 for males and .216 for females in Table 2.

Scholarship aid, S, which includes Federal and state need-related grants, and loans, L, available to students from medium and lower income at subsidized rates with Federal guarantees both have the expected positive effect on opportunities, for both males and females. The significance of both are very high ($t = 6.42$ and $t = 20.35$ for S, and $t = 23.18$ and $t = 20.08$ for L). The betas in Table 2 suggest that

they each account for another 13 percent or so of the shifts in the supply of funds.

Opportunities for further education are adversely affected by the number of siblings (B) that must be supported out of the family income and by the chance, in the case of males, of being the first-born (O). In both cases, the parent's capacity and willingness to bear the foregone earnings costs is at stake, and limits the amount of investment by the family. The effects from siblings and from being the first born are both highly significant ($t = 45.41$ and $t = 10.97$ for males, for example) although their betas indicate that they are both relatively less important than any one of the sources-of-funds discussed above.

Work-time (W) withdrawn from study has a negative and a highly significant relation to the amount invested, again as expected. Although the presence of part-time earnings may make some investment in past-secondary education possible, it does reduce the amount of foregone earnings invested at any one time and may also reduce the scope of the planned degree program.

IV. Conclusions

Although there are many studies of the returns to education, relatively little is known about the influences on the amount invested in education by families. A family decision making model, subject to the family budget constraint, where each individual lives for two generations suggested by Becker has been extended and applied in this paper. It provides a more reasonable context for the analysis of family

saving and investment decisions, especially as they relate to investing in education.

The major conclusion is that differences in opportunities due to differences in the supplies-of-resources among families are more important, both individually and collectively than are differences in capacities in determining differences in the amount invested. The levels of significance, and beta coefficients, for family income, student loans, work time, and scholarships, are all larger than the levels of significance or betas for any of the influences such as ability, the parents education, or uncertainty affecting investment-demand.

Ability and the mother's education, which may be related to human capital formation in the home, do affect investment demand, consistent with what Becker has referred to as the "elitist" view. But these effects at least in this nation-wide sample are neither strong or dominant in the U.S. Expected non-monetary returns, as a whole, also are less significant on the demand-side relative to the effect from lower expected rates of returns, the latter due primarily to rising foregone earnings at each higher level of education.

The significance of these conclusions lies in the fact that the income distribution among families, property income to the side, is determined overwhelmingly by differences in the amount and quality of the education obtained. In this article we have sought to go the next step--looking into what determines the differences among families in the amount of education obtained.

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Footnotes

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