Faculty Working Papers

THE POSITIVE RELATIONSHIP BETWEEN

UNEMPLOYMENT AND PRICE CHANGES

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#229

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The Positive Relationship Between Unemployment and Price Changes

It has been a commonplace in recent years to talk about the tradeoff between unemployment and inflation. In a gross, undiscriminating sort of way, this is appropriate. On the upswing, when unemployment is falling, prices and costs are bid up and "inflation" prevails. In recession, when unemployment is rising, prices rise less rapidly if they do not actually fall. Nobody thought this gross negative relation between unemployment and price changes very startling.

Unfortunately, the trade-off has become a kind of cliche for economic policy and is usually referred to as "The Phillips Curve." This designation is a misnomer, as will be indicated shortly. Nevertheless, the title has been popularized through numerous repetitions by prominent economists and others who presume to speak with authority on this subject, and the relationship will be referred to hereafter as the pseudo Phillips Curve. The usual interpretation of it is that full employment and price stability are incompatible. At one extreme full employment is accompanied by inflation; at the other, steady prices are accompanied by high unemployment; and between there are only compromises. Paul Samuelson says "...it is a difficult social dilemma to decide what compromises to make." (Economics, quoted from 5th ed., p. 383; later editions have similar statements.) Henry Wallich, in a lecture at the University of Illinois stated, "If you want price stability, you have to accept unemployment way out here" -- indicating the lower right hand end of the curve he had drawn.

The relationship is often referred to as "close," but as Chart 1 shows, a curve is not a good representation of the facts. Over the entire period

from 1948 to 1973, there is very little correlation between unemployment
and changes in wholesale prices, both being expressed in percentage terms.
The scatter shows little curvelinearity and only about a fifth of the
variance in wholesale prices is "explained" by unemployment. Coming upon
this relationship in 1970 and looking only at the data for the 1960s -- the
points connected by the solid lines -- one might believe a valid curve to
exist. However, this good pattern for the 1960s was partly just historical
accident. The period of extraordinary price stability during the early
1960s, following the recessions of 1958 and 1961 gave way in 1965 to the
inflation generated by the Vietnam War. At the same time unemployment
decreased, mainly because employment expanded rapidly, but with a partial
assist from the diversion of potential workers into the armed forces. So
the movements showed a marked inverse correspondence. After those seemingly
revealing developments, however, the more rapid inflation of the 1970s was
accompanied by generally higher unemployment, bringing the years of
"stagflation" in which the relationship of the 1960s could no longer be
considered valid. Unemployment and inflation are commonly taken as the key
indicators for both monetary and fiscal policy, and many economists hold
that there is no set of measures which can appropriately fight both at the
same time.

Evidently the relationship is much more complex than it was thought to be.
This may be illustrated by the schematic diagram designated as Chart 2.
The primary relationship set up by A. W. Phillips in his article "The
Relation Between Unemployment and the Rate of Change of Money Wage Rates in
the United Kingdom 1861-1957" (Economica, Vol. XXV, 1958) is represented by
the downward pointing line designated by the letter b. In the United States

even this limited inverse relationship is not so close as it might be,
because there are lags, frictions, contractual, legislative, and other
interferences. But it is a true negative relationship to the extent that
it works. It and the downward pointing line designated a are the only
negative relationships on the chart. All the others represent positive
relationships.

The pseudo Phillips Curve is valid only to the extent that wages make
prices. Those who use it to describe the broad tradeoff between unemploy-
ment and inflation in effect assume that the movements of wages and prices
are so much the same that one can jump directly from the former to the
latter along the bottom line of the chart. This assumption has been
carefully cultivated in America. Under conditions of administered pricing,
it is considered desirable to have a rationale for price increases. Higher
wage rates and rising labor costs provide a ready and seemingly plausible
version of such a rationale. The pseudo Phillips Curve is in this sense
a reflection of pricing propaganda.

As Chart 2 shows, the relation of wage rates to prices is complicated
by passing through another stage which reflects the effects of productivity
changes. Furthermore, the total relationship of unemployment to prices
involves another, a positive relationship, through a separate channel
designated compensatory demand.

The nature of the relationship by which prices derive from aggregate
demand or income and aggregate output was pointed out in my book, Economic
Forecasting (p. 507). As a first stage in the analysis, only wage income
was considered. Then, "The price level equals wage income divided by
output, but total wages are man hours times the wage rate and total output

is man hours times output per man hour." Thus,

$$P = \frac{Y_W}{O} = \frac{WR \cdot MH}{OPH \cdot MH} = \frac{WR}{OPH}$$

So in this preliminary trial, prices could be considered to depend on wage rates and productivity alone. The correlation there presented indicated a good fit in a simple correlation based on this equation; the same is true of an alternative linear relationship with a negative sign on output per man hour as a second independent variable. In most years the changes in productivity are fairly dependable, offsetting in part the upward thrust of wage rates on prices. However, this is not always the case. During the past year, in the early stages of the 1974 recession, productivity declined, aggravating the push of wage rate increases as a spur to inflation. In other words, it is at best an oversimplification to assume that a direct jump from wage rates to prices can be valid.

Actually, the basic income-output equation which is relied upon in this kind of calculation should take other kinds of income into account. The strong growth of transfer payments over the years has added an element of strength to the price uptrend. In periods when proprietors' income moved up faster than wages, additional thrust was again added to the upswing; as examples, advances in charges for medical care and repair services became important contributors of this kind during the last two decades. More recently, record high interest rates have become both a contributor to and a reflection of inflationary pressures.

Even industrial pricing practices that modify the distribution between wages and profits can affect the usual pattern in given years. The established practice of American industry is to add an "appropriate"

percentage gross margin to outlay costs at standard volumes; this is
calculated to provide adequate cash _low (profits plus capital consumption
allowances) and to cover such additional requirements as indirect business
taxes. Experience shows that setting prices in this way has tended to
produce a rather constant ratio of gross corporate margin to gross national
product over a long period of years.

Each of the three components of the gross margin can be considered to
derive from sales volume and the value of the capital stock. In relation-
ships using as independent variables the gross national product and the
capital stock, the sign of the capital stock variable is positive for both
indirect business taxes and capital consumption allowances but is negative
for corporate profits. (pp. 461-8) In a series of tests, the negative
coefficient was not far from the sum of the two positive coefficients,
confirming the constancy of the percentage gross margin. Temporary
deviations from this norm may be readily observed in specific years. For
example, tax changes introduced some irregularities through investment
allowances and rapid amortization rules; they shifted funds from profits to
capital consumption allowances while changing the combined total only
moderately in relation to gross national product. A more recent large
deviation was produced in 1974 when many firms in a liquidity squeeze
abandoned the traditional practice in favor of enhancing profits by price
increases beyond those needed to adjust to rising costs.

Redistributions of income by kind of recipient have tended to be
limited and often temporary. Nevertheless, they too add to the totals of
product sales and factor income which form the numerator of the demand-
output ratio that yields the implicit price deflator. This is consistent

with the wage-productivity approach by reason of the fact that rising

productivity effects savings in labor cost and labor demand, reducing the

flow of dollars chasing goods; it differs in that, given the productivity

reduction of the wages flow and the addition of other kinds of income,

the overall measure of demand or income by itself represents the primary

influence on prices. The essence of this alternative approach may be

summed up in the statement, "The level of activity, in its dual aspects of

aggregate income and aggregate cost is the key to price forecasting."
(p. 505)

Returning now to Chart 2, the positive relationship operating through

"compensatory demand" is opposite in effect to that operating, somewhat

inefficiently, through wage rates and labor costs. When unemployment rises,

action is undertaken to offset its effects on income and consumption. The

most direct and immediate response is in unemployment compensation and

related fringe benefits, but the government is likely to supplement this

with other fiscal measures. In addition, the consumers themselves try to

maintain established living patterns oy drawing on assets and credit, that

is, by dissaving in various ways. So a perceptible increment to the

expenditure flow enters the picture as a separate and distinct supplement

to the flows which derive directly from the production of goods and

services. This increment, like any other addition to activity, represents

a positive influence on prices.

Added to the chart in the upper level is a relationship between idle

capacity and prices. Changes in the rate of capacity utilization and the

rate of unemployment both derive largely from changes in output, and the

two are of course highly correlated. Note, however, that no compensatory

demand arises from an increase in idle capacity. Its effect, on the

contrary, is to depress investment expenditures and become a direct element

of disinflation. Unemployment is to some degree a less satisfactory

variable for measuring the effects of output changes on prices because of the

phenomenon known as "labor evaporation," as some of the unemployed give up and

drop out of the labor force. This is now largely ignored, but was widely

discussed in the late 1940s as a result of errors in forecasting unemployment

at the end of World War II.

The interrelations of these factors were tested in the series of corre-

lations summarized in Table I. Changes in wholesale prices other than farm

products and foods were in every case made the dependent variable. Wholesale

prices are more sensitive and revealing than the broader indexes and have more

direct relationships to such variables as idle manufacturing capacity and unit

labor costs in the private nonfarm economy. Some preliminary tests indicate

that the intercorrelation of price indexes makes improbable any serious

distortion of basic relationships by use of the wholesale index.

The independent variables used are as follows:

X_1 -- the rate of unemployment

X_2 -- the rate of idle capacity in manufacturing

X_3 -- the percentage change in private, nonfarm unit labor costs

X_4 -- the percentage change in real inventory holdings

X_5 -- the percentage change in real gross national product

Data for almost a half century were used, and two subsets were separately

considered in order to check the possibility that structural changes had

modified underlying relationships. The first subset covered the years 1922

through 1941 but excluded 1933 and 1934, because price relationships were

then distorted by the National Recovery Administration Program, popularly

known as the "Blue Eagle," a program specifically designed to reverse the
progressive deflation in the depths of the great depression. The second
subset covered the years from 1948 through 1969 during which it may be
presumed that the data have a more accurate statistical base. The years
of disturbance during and just after World War II were omitted.

The most striking feature of these correlations is the way the sign of
the unemployment variable flips over to positive whenever the idle capacity
variable is included in the same equation. This is consistent except for
equations B1, B5, and B7. In those cases as well as in other cases where
the sign for unemployment is negative, the T-test indicates that the effect
of the unemployment variable falls below the level of significance. Apparently
capacity utilization is much more important than unemployment as an influence
on pricing policy. The goal of full employment is less a direct concern for
industry than the goal of adjusting fast to expand returns to capital or
minimize losses.

In many of the equations in which the unemployment rate appears with a
positive coefficient, its effect is indicated as significant by the usual
criterion. This is true in all of the equations in the combined correlation
as well as in both subsets where R^2 is 0.6 or higher. In relating unemploy-
ment and prices, therefore, it is evident that unemployment makes both
positive and negative contributions to the rate of price change. The positive
contribution may be thought of as a demand-pull contribution, the negative
as an inverse cost-push contribution. On the whole, the positive indications
are much stronger than the negative.

What this means in practice is that the effects of unemployment in support
of inflation are always overriden by other variables. When unemployment is
low, it makes hardly any direct contribution to inflation, but high utilization
of capacity and rising overall demand tend to push prices up. In these

circumstances, high employment tends to contribute to speculative surges in demand by firming up the consumer credit base, but the resulting changes in output also affect utilization and aggregate expenditures. On the decline, the increase in compensatory demand only partially makes up the losses in income from other causes. When unemployment is high, the specific responses to it tend to raise prices, but the effects of low capacity utilization and falling overall demand are more important in tending to lower them. What creates a special problem for public policy is the spreading prevalence of administered pricing, whose effects are described in a Wall Street Journal story stating that the "aluminum makers vow they will cut production, not prices, during the slump" (Dec. 30, 1974, p. 20). Nevertheless, falling receipts combine with involuntary inventory accumulation and commitments for capital expenditures to impose a liquidity squeeze, so that some liquidation in industry and trade is forced, with dumping of excess inventories at sacrifice prices.

Also of some interest is the question of shifts in the importance of variables as between the two sub-periods studied. Strongly coming to the fore in the later period is unit labor cost (X_3); this shift is consistent and highly significant. Possibly the strengthening of contractual labor relations and the growing downward rigidity of wage rates have become permanent influences on price changes. There is also a hint that the unemployment compensation system and that sharper, more rapid adjustments of inventories may be significant. On the other hand, the comparative stability of wholesale prices in the later period, deriving partly from the absence of any major interruptions to the postwar prosperity, suggests that any such conclusions must be at best tentative.

The complexity of the problem of overall economic management does not inhere primarily in an irreconcilable conflict between the goals of full employment and price stability. Control of the mixed economy is hardly possible without overall planning mechanisms and firmness in political action. The planning in the corporate sector has a different focus, one that brings destabilizing adjustments rather than a resolution of overall difficulties. Unless these modes of operation are changed, price behavior will continue to reflect the self-interests of groups with varying economic power and political influence. There will be erratic changes at times, modifying a persistent tendency toward inflation, and vacillating government policy will tend to favor protected producer groups at the expense of the consuming public.

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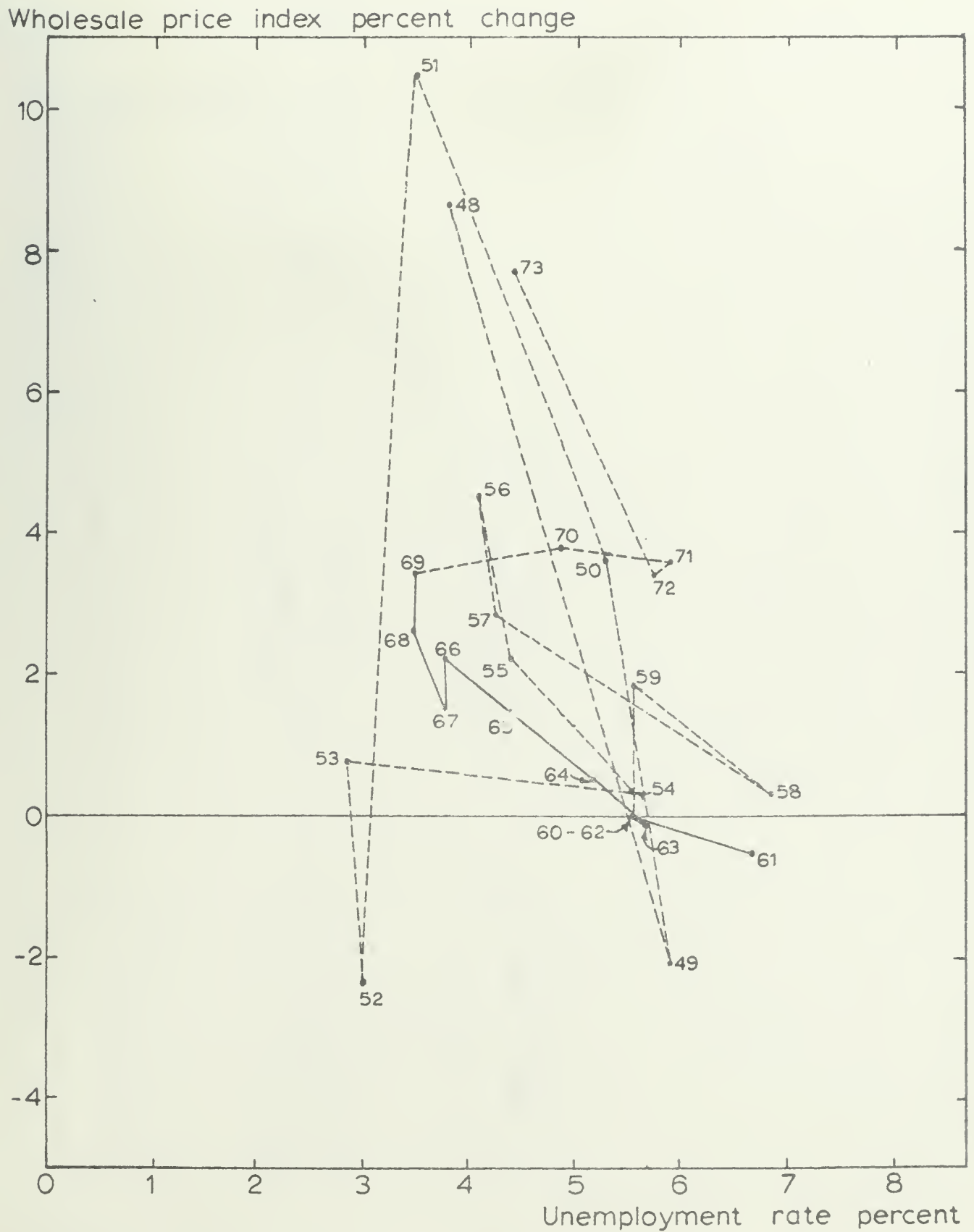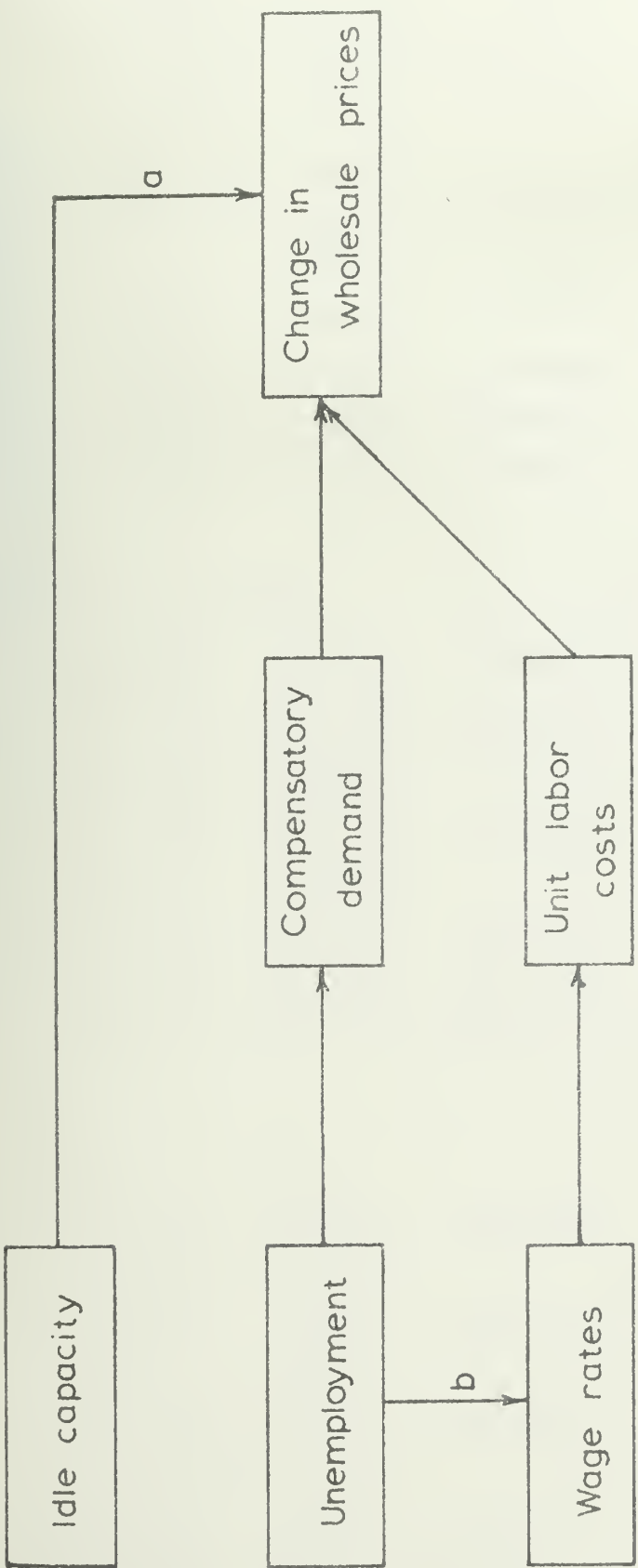Chart 1. Wholesale Price Changes and Unemployment

Wholesale price index percent change

Unemployment rate percent

Chart 2. Some Influences on Wholesale Price Changes

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Coefficients Relating Changes in Wholesale Prices to Other Variables
(t-ratios in parentheses)

Equation	Constant	X_1	X_2	X_3	X_4	X_5	R^2
Combined data set 1922-69 excluding 1933-34 and 1942-47							
1	5.224(5.9)	0.823(4.6)	-0.583(-6.6)				.587
2	1.168(1.1)	-0.132(-1.1)		0.355(2.8)			.248
3	4.733(4.7)	0.780(4.2)	-0.543(-5.6)	0.102(1.0)			.597
4	-0.935(-0.9)	-0.085(-0.9)			0.497(5.3)		.482
5	3.210(2.2)	0.614(2.9)	-0.435(-3.6)		0.199(1.7)		.617
6	-0.075(-0.1)	-0.142(-1.4)				0.379(4.3)	.392
7	3.883(3.2)	0.678(3.4)	-0.484(-4.5)			0.140(1.6)	.613
8	3.178(2.2)	0.608(2.8)	-0.433(-3.5)		0.137(0.8)	0.069(0.6)	.621
9	1.308(0.8)	0.427(2.0)	-0.284(-2.2)	0.274(2.3)		0.270(2.7)	.665
Data for 1922-41 excluding 1933-34							
A-1	4.067(3.1)	1.071(5.7)	-0.675(-6.9)				.764
A-2	-0.543(-0.2)	-0.045(-0.3)		0.240(1.3)			.102
A-3	4.464(3.3)	1.174(5.8)	-0.744(-6.7)	-0.138(-1.2)			.787
A-4	-5.832(-3.8)	0.182(1.7)			0.614(6.0)		.707
A-5	0.244(0.1)	0.784(3.1)	-0.443(-2.6)		0.261(1.6)		.800
A-6	-4.046(-2.4)	0.082(0.7)				0.426(4.4)	.565
A-7	1.627(0.9)	0.870(4.3)	-0.520(-4.3)			0.171(1.9)	.814
A-8	0.547(0.2)	0.793(3.2)	-0.456(-2.7)		0.112(0.5)	0.132(1.1)	.818
A-9	1.706(0.7)	0.880(3.0)	-0.528(-2.8)	-0.007(-0.1)		0.167(1.4)	.814
Data for 1948-69							
B-1	5.655(2.0)	-0.025(-0.0)	-0.272(-1.3)				.263
B-2	1.028(0.3)	-0.146(-0.2)		0.647(2.2)			.354
B-3	-7.548(-2.0)	3.276(3.1)	-0.637(-3.7)	1.138(4.2)			.631
B-4	3.146(1.2)	-0.597(-1.2)			0.387(2.6)		.409
B-5	3.035(1.1)	-0.395(-0.4)	-0.056(-0.3)		0.366(2.1)		.411
B-6	4.994(1.7)	-0.923(-1.7)				0.301(1.4)	.274
B-7	4.747(1.6)	-0.344(-0.3)	-0.156(-0.6)			0.211(0.8)	.289
B-8	3.116(1.1)	0.105(0.1)	-0.167(-0.8)		0.681(2.4)	-0.540(-1.4)	.472
B-9	-11.642(-3.3)	3.101(3.4)	-0.441(-2.7)	1.319(5.5)		0.462(2.8)	.747