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An Experiment with an Incomes Policy

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The growth in output since the beginning of the recovery in early 1975 has matched that of previous upturns, but unemployment and inflation remain abnormally high. The twin problems of high unemployment and inflation may remain with us for several years; forecasts are remarkably similar on that point, with the jobless rate between 6 and 7 percent and the inflation rate around 5 to 6 percent in 1980.[1] The persistence of these twin problems helps explain why incomes policies are again receiving consideration by the press, economists and policy makers.

The term "incomes policy" refers to a wide range of government measures which supplement the traditional instruments of fiscal and monetary policy and which are designed to improve the tradeoff between unemployment and inflation. An incomes policy can incorporate direct government controls to hold down prices and freeze wages, as well as milder policies such as "jawboning." It can also include measures that would tend to promote competition in labor and products markets in order to keep prices down, such as more vigorous antitrust action. In general, incomes policies are designed to bring about a lower level of prices than would otherwise exist at a given level of unemployment. They are aimed at affecting prices through the supply side, such as by constraining costs of production or decreasing monopoly power.

European experiences with incomes policies in the post-World War II period mostly have involved a wages guideline, with wage increases tied to increases in output per manhour.[2] This paper applies an approach of that type to the U.S. economy. We consider the impact upon U.S. aggregate economic activity of an incomes policy which sets the average increase in wages equal to the trend rate of growth in labor productivity. The economic impact is estimated through simulations of the U.S. economy with a version of the MPS model (Massachusetts Institute of Technology/University of Pennsylvania/Social Science Research Council) over the 1967-1971 period. The policy analyzed here differs from the policies actually adopted in the 1971-73 period because it is concerned only with the rate of growth of wages. One advantage of such an approach, as we will discuss later, is that by controlling prices indirectly through wages, we can avoid direct cumbersome controls on final prices. We have analyzed the 1967-71 period because we lacked sufficient data to analyze the period of the late 1970's, and because that earlier period produced unemployment and inflation problems that our conventional tools of monetary and fiscal policy did not—or could not—solve.

The period beginning in 1967 was one of phenomenal increases in unit labor costs and soaring prices. Arthur Okun has suggested that we had a "second chance" in mid-1967 to stem the inflationary climb, which would have been successful if we had taken advantage of traditional fiscal and monetary policy tools.[3] But studies of that period, using a variety of monetary- and fiscal-policy mixes, indicate that we could not have avoided a substantial rise in inflation in late 1968 without suffering a high cost

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in terms of lost jobs and output.[4] The present study is designed to determine what impact an incomes policy would have had in the 1967-71 period. We do not consider the difficult problem of policy administration, and during the model simulations of proposed wage constraints, we have made a number of assumptions which significantly affect the final results. We ask the following question:

> What is the result of imposing restraints solely on wages with respect to major economic measures such as unemployment, prices, real income and income shares?

This article describes an experiment in incomes policy. It is called an experiment because the results presented cannot be considered a forecast of what actually would have happened if such a policy had been implemented. Rather the paper considers the way in which the incomes policy would be analyzed, through the use of an economic model to determine the policy's impact on inflation, unemployment and several other variables. The paper points out the effects but ignores the costs of an incomes policy, such as administrative costs or possible resource misallocation. In summary, our experiment indicates that a wage-directed incomes policy will have an ambiguous effect on output and employment, depending on the assumptions made, and that the labor share of income will be less than otherwise would have been the case. The major benefit of the incomes policy would be a temporarily lower rate of inflation. How long this would last cannot be determined in the model. The paper does not consider the possibility of supplementing the incomes policy with monetary or fiscal measures, but attempts to retain historical monetary and fiscal policies.

The next section of this paper describes the price equation in the MPS model. This is followed by the simulation results of a wage-control policy, and then by a discussion of the meaning and applicability of the econometric results.

Inflation and the Price Equation in the MPS Model

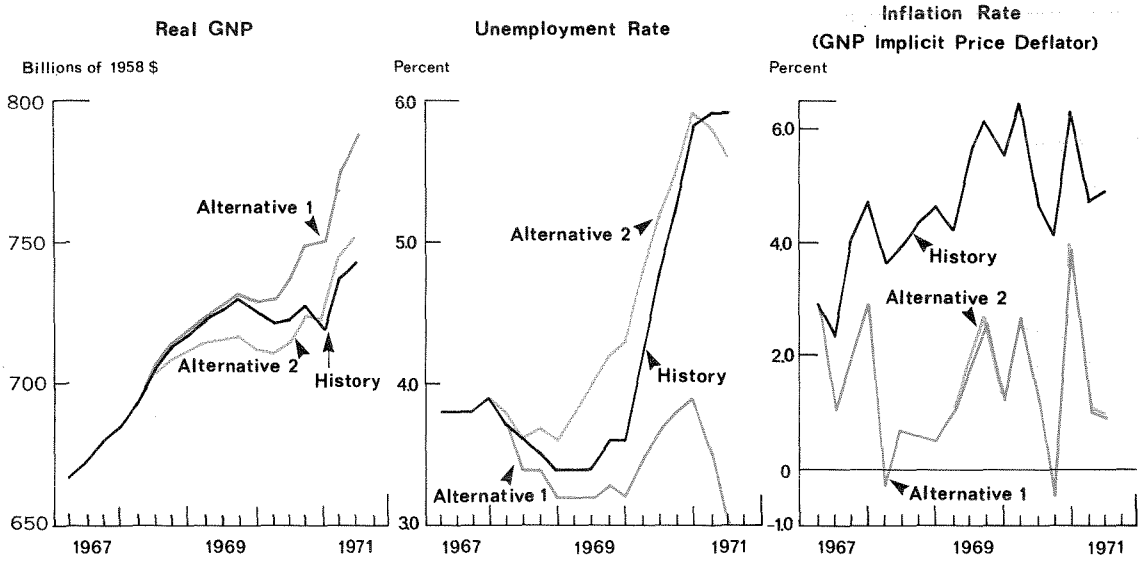
Incomes policies are essentially efforts to reduce the rate of inflation at a given level of unemployment. Policy measures which associate wage and productivity increases are designed to control the rise in unit labor costs, the predominant price-raising factor in the short-run in most large structural economic models.

The price equation used here ignores the role of money in price determination, which may appear at odds with monetary explanations of inflation. If inflation is fundamentally a monetary phenomenon, why is the money supply excluded from the direct determination of prices? The answer is that the price equation is embedded in a larger model in which prices and money are indeed tied together in the determination of income, output and employment. The channels in the MPS model through which changes in money affect prices and output have been discussed in detail elsewhere.[5] In brief, a change in the rate of growth of the money supply will have only transitory effects on real-sector variables such as employment and real output. In the longer run, the model has very classical properties, with real output being left unaffected by the change in the money stock, and with the rate of inflation being determined entirely within the monetary sector. In the shorter run, however, an acceleration in the rate of money growth initially stimulates the demand for goods and services as well as for the labor to meet that demand. The additional pressures in labor and other factor markets affect wages and other costs of production; in this sense, changes in business costs are the proximate but not the fundamental cause of inflation.

The price equation in the MPS model, as in most large scale econometric models, is a cost mark-up equation. It has been shown by Nordhaus that pricing behavior for a profit-maximizing firm results in an optimal price (net of indirect taxes) based on factor costs. These costs include the prices of capital services, labor, raw materials and a trend component to

Chart 1

Major Economic Variables--Comparison of Historical Values and Wage-Control Model Simulations



capture the advance of productivity through time. The level of prices can then be determined by the level of these costs, a term representing productivity, and a scale factor, which represents the mark-up fraction.[6]

Numerous econometric efforts to find the impact of the price of capital services have been unsuccessful, so that this cost is generally assumed to be estimated in the constant term of the price equation. In addition, the price index which is estimated by the basic behavioral price equation is the deflator for nonfarm domestic business product. Also, it is a value-added concept, which means that the cost of raw materials to the nonfarm business sector does not enter directly in the determination of the price index. Raw-materials inputs to the business sector consist mainly of farm products and imports, so that any increase (say) in their prices will raise prices in the aggregate nonfarm business sector with a delay, as each price increase is passed on to final consumers. With these considerations in mind, we can represent the basic price equation as follows:

$$P = k \cdot W/Q \qquad (1)$$

where

P = Price deflator for nonfarm domestic business product
W = Employee compensation per manhour in nonfarm domestic business
Q = Output per manhour
k = Mark-up factor
W/Q = Unit labor costs

Price determination in the form of equation (1) means that if business profit margins (k) remain constant, then price changes will be strictly labor-cost determined. In this simplest representation, a rise in unit labor costs (W/Q) will be matched by a proportionate rise in prices. Thus the rate of price inflation is determined solely by the "pass-through" of labor-cost increases into prices.

Equation (1) is an oversimplified version of the MPS pricing equation.[7] Four major adjustments convert it into a form suitable for short-run price estimation in the MPS model. First, the mark-up is assumed to vary with demand pressure. Second, terms in current productivity

and trend productivity are included. Third, the rates of change of farm and import prices are added to capture initial adjustment effects. Lastly, prices are assumed to adjust with a lag to cost and mark-up changes.

It is assumed that the mark-up fraction (k) depends upon the level of excess demand. Firms which possess some short-run monopoly power might raise their mark-up margins to a high level during a boom and shade their prices when demand weakens. Demand pressures are represented by the ratio of unfilled orders (OUPD) to shipments of producers' durable equipment (EPD), specifically:

$$k = b_1 + b_2(OUPD/EPD)_t - b_3(OUPD/EPD)_{t-1}$$

The negative coefficient (b_3) implies a rate-of-change variable which is intended to capture the effect on the mark-up of expectations of demand change.[8]

Secondly, it is assumed that firms base their estimate of the rate of technical change both on long trends and on more recent movements of average labor productivity. The value (Q) is replaced with two terms: a term representing current productivity (measured as an eight-quarter average to remove some of its cyclical movement) and a time variable to capture long-run trend movement. Thirdly, since the price index is a value added-deflator for the nonfarm domestic-business sector, the index will initially decline when farm or import prices rise if these costs are not immediately passed on to final consumers. In order to capture this temporary effect, a fixed-weight average of farm and imported-materials prices was added to the equation. Its coefficient should be negative. Finally, it is assumed that cost and mark-up factors influence prices with a distributed lag through time. To incorporate lagged adjustment, the price index was included with a one-period delay on the right-hand side of the estimated equation.

Equation (1) was estimated with these four modifications, subject to the constraint that the long-run elasticity of prices to wages be unity. The result was as follows (numbers in parenthesis are t values):

$$\ln\left(\frac{P}{W}\right) = \underset{(7.23)}{.7099}\ln\left(\frac{P_{-1}}{W}\right) + \underset{(2.83)}{.07331}\left(\frac{OUPD}{EPD}\right) - \underset{(-1.60)}{.04001}\left(\frac{OUPD}{EPD}\right)_{-1}$$

$$- \underset{(-1.13)}{.00746}\sum_{i=0}^{7}\ln\left(\frac{XBNF}{LMHT}\right)_{-i}$$

$$- \underset{(-.53)}{.01258}\ln\left(\frac{31.91\ PWM + 68.09\ PFM}{31.91\ PWM_{-1} + 68.09\ PFM_{-1}}\right) + \underset{(.09)}{.00011}\ JS4$$

$$- \underset{(-.99)}{.00109}\ JS2 - \underset{(-.13)}{.00016}\ JS3$$

$$- \underset{(3.56)}{.001438}\ TIME - \underset{(-3.60)}{.11742} \qquad (2)$$

1954:I to 1968:IV

$\bar{R}^2_e = .9993$; SE = .0028; DW = 1.93; DF = 47

where

P = Price deflator for nonfarm domestic business product
W = Employee compensation rate in nonfarm domestic business
OUPD = Unfilled orders for producers durables
EPD = Expenditures on producers durables
XBNF = Nonfarm domestic business product and produce of households
LMHT = Manhours in nonfarm domestic business sector, including proprietors
PWM = Raw materials prices, imports
PFM = Raw materials prices, farm
JS2 = Seasonal dummy variable for the second quarter
JS3 = Seasonal dummy variable for the third quarter
JS4 = Seasonal dummy variable for the fourth quarter
Time = Time with 1947.1 = 1, 1968.4 = 88

The most notable features of this equation are the following:

(1) The lag structure of wages means that any wage change is almost entirely passed through to prices in a little over two years. A one-percent increase in wages will result in .75 percentage-point increase in the rate of inflation within one year and about .95 percentage-point increase by the end of two years.[9]

(2) The trend rate of growth in productivity results in a steady decline in prices each year of

about .60 percentage points, while a one-percent increase in the sum of current and lagged estimates of productivity leads to an additional decline of about .36 percentage points.

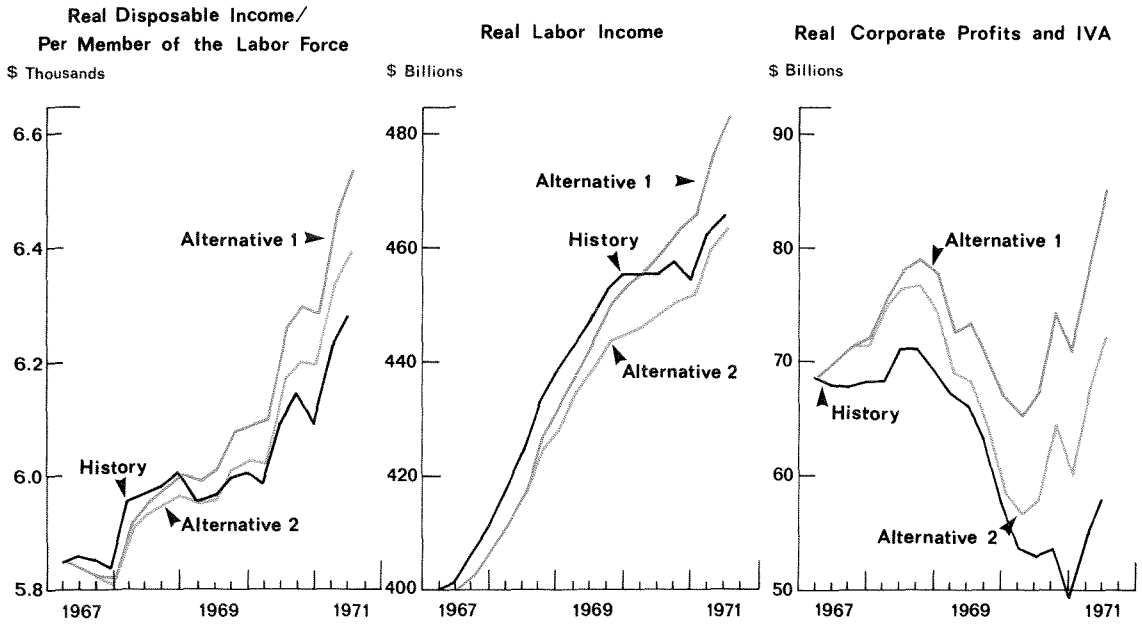
(3) Prices respond positively to demand pressures, even when unit labor costs are held constant. This is demonstrated by the estimated coefficients of unfilled orders to shipments. On average, during post-Korean War cycles, the demand effect is estimated to have raised the rate of inflation between trough and peak quarters about 2.5 percentage points, assuming no changes in the other price determinants in equation (2). This result is consistent with Gordon's recent work on the impact of excess demand on prices, which suggests that on the average, demand pressures have added about 2.8 percentage points (trough to peak) to the inflation rate during post-World War II business cycles.[10]

The pricing behavior estimated by equation (2) has major significance for stabilization policy. It suggests that an incomes policy which can restrain the rise in unit labor costs through control of wage-rate increases can successfully control domestic nonfarm prices, without directly controlling the latter. Incomes policies which fundamentally rely on wage restraints have an important advantage in that they obviate the need to create a cumbersome administrative apparatus to control final prices. Interesting examples of two such policies are the tax-based incomes policy advocated by Henry C. Wallich and Sidney Weintraub,[11] and an incomes policy recently updated by Vijaya G. Duggal and Lawrence R. Klein.[12]

The importance of the term representing demand pressures illustrates the potential significance of monetary- and fiscal-policy effects upon prices. An increase in aggregate demand which is initiated, say, by expansive monetary and fiscal polices can act to increase demand pressures and thereby prices. An incomes policy which holds down unit labor costs will not be able under such circumstances to stop the inflationary rise due to demand-pull pressures, and will not survive when monetary and fiscal stimulus becomes excessive.

Chart 2

Returns to Labor and Capital--Comparison of Historical Values with Wage-Control Model Simulations



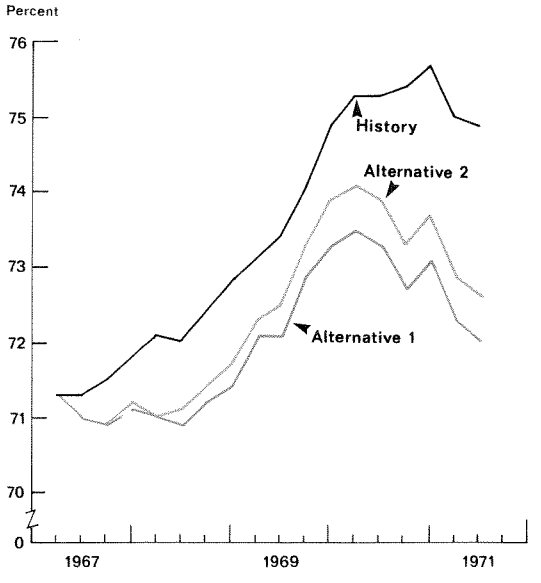
Controlling Unit Labor Costs Through an Incomes Policy—A Simulation Experiment

From this discussion of the direct determinants of prices, we can conclude that a change in wages equal to the change in productivity will result in unchanged prices after a two-year adjustment period, assuming no change in excess demand. If prices are held down by an incomes policy, a given amount of aggregate demand should, at least in the short run, result in greater real output and employment, since part of the demand does not become dissipated in higher prices. On the other hand, because of adjustment lags between wages and prices, holding down wages may initially hold down real income and could adversely affect employment. To determine the impact of wage controls upon economic activity, we turn to simulation experiments with the MPS model over the period from 1967.2 to 1971.2.

These experiments may be identified as Wage Control-Alternative 1, and Wage Control-Alternative 2. One common element is present in both experiments—the assumption of a constant 3-percent annual rate of increase in nominal wage rates, which is equal to the long-term growth rate in output per manhour. The historical and assumed wage rates are shown below.

Chart 3

Labor Share of National Income



Hourly Wage Rates in Nonfarm Private Domestic Business
Annual Rate of Increase, 1967-1 - 1971.2

	Historical Value	Assumed Value in Wage Control Alternatives
1967.1	2.5	2.5
.2	6.5	3.0
.3	6.7	3.0
.4	4.8	3.0
1968.1	10.7	3.0
.2	6.0	3.0
.3	7.5	3.0
.4	8.2	3.0
1969.1	4.5	3.0
.2	7.5	3.0
.3	6.2	3.0
.4	8.7	3.0
1970.1	6.4	3.0
.2	6.1	3.0
.3	10.2	3.0
.4	2.6	3.0
1971.1	8.0	3.0
.2	7.5	3.0

The difference between the actual historical value and a wage-simulation result is a measure of the impact of controlling the increase in wages.[13] But, if this difference is to reflect accurately the impact of wage controls, it is necessary that the structure of the MPS model allow all significant reactions to the wage change to take place. In several ways, the MPS model is not structured to capture the economic response to the wage changes we have made.

We have attempted to adjust the model for some of its structural shortcomings, and we acknowledge that the adjustments, which are our "best guesses," are somewhat arbitrary. It is for this reason that we present two wage-control alternatives and detail the judgmental changes imposed upon the results.

In Wage-Control-Alternative I, we not only assume a constant 3-percent average wage increase, but also adjust the cost of capital for producers durables to reflect the expected drop in inflation rates due to this 3-percent wage constraint.

The cost of capital depends in part upon real interest costs, which are determined by the difference between a nominal long-term interest rate and the expected rate of inflation. The expected inflation rate is estimated by a distributed lag on past inflation rates. In the wage-control simulation, the mechanical application of the distributed lag on past rates of inflation results in a very low expected inflation rate, and hence a very high real rate of interest and cost of capital. The high cost of capital worked in our initial simulations to reduce investment substantially in business durable equipment, so we then adjusted the cost-of-capital term so that it would not go above the rates experienced in the first half of the 1960's, when prices and interest rates were similar to their simulated values.[14]

Business expectations of future prices are an important determinant of investment plans and expenditures. Undoubtedly, an incomes policy can influence these expectations to a major extent. Our assumption regarding price expectations, and hence the cost of capital, implies that the business community believes the incomes policy will be successful in holding down unit labor costs through its constraints on wage-rate increases. If the business community believes otherwise, any number of alternative possibilities could emerge. For example, if business felt that controls would lead to bottlenecks in certain raw-materials areas, a sizable increase in demand could take place, creating price pressures which otherwise would not exist.

Our price expectations assumption also implies that market participants build their inflation expectations on more information about the effects of wage controls on prices than simply extrapolating past price changes into the future.[15]

Wage Control-Alternative 1 results in an improvement over historical values for real output, employment and prices (Table 1). Real output increases steadily and by 1970, GNP is $19.7 billion greater than historical estimates. The unemployment rate declines in response to the greater growth in real output and remains below 4.0 percent over the 1967-70 period; by 1970 it is 3.7 percent, compared with the 5.0-percent historical value. The rate of inflation responds to the drop in wages, falling in 1967 to 2.6 percent from its historical rate of 3.2 percent, and remaining below 2.0 percent over the following three years. By 1970, the inflation rate is 1.7 percent, compared with the historical rate of 5.5 percent.

Real disposable income per member of the labor force declines relative to historical values for the first two years of the simulation, but then increases substantially, reaching $6,231 in 1970, or $151 greater than its historical value. The changes in this measure mostly reflect the time required in the model for prices to adjust fully to changes in wages. Because of this delayed reaction, the real purchasing power of wage income will initially fall while profits, calculated residually, will show improvement. We may therefore expect some drop in labor income (relative to its historical value), as prices adjust slowly to the lower rate of wage growth. In fact, labor income does not increase relative to historical values until 1970, the last year of the simulation. The earlier increase in real disposable income represents an increase in the purchasing power of non-labor components: property and proprietor income, and transfer payments. Alternative I thus suggests that labor income may not show any marked increase (relative to historical values) when an incomes policy is initially instituted.[16] In Table 2, we show the effect of Alternative I upon real GNP and its components, along with the differences between these results and historical values. The decline shown here in personal consumption is related to the drop in real disposable income in the initial periods of the simulation. The relative decline in business fixed investment reflects the higher real interest

TABLE 1
Historical Values and Wage Control Alternatives for Selected Economic Variables, 1967-70

	Historical Value	Wage Control Alternative 1	Change from Historical Value	Wage Control Alternative 2	Change from Historical Value
(1) Real GNP (Billions of 1958 dollars)					
1967	$675.2	$675.3	$ .1	$675.1	$ –.1
1968	706.6	708.1	1.5	704.0	–2.6
1969	725.6	728.2	2.6	715.5	–10.1
1970	722.3	742.0	19.7	718.7	–3.6
(2) Unemployment Rate (Percent)					
1967	3.8	3.8	.0	3.8	.0
1968	3.6	3.4	–.2	3.7	.1
1969	3.5	3.2	–.3	4.1	.6
1970	5.0	3.7	–1.3	5.4	.4
(3) Inflation Rate (GNP Implicit Deflator)					
1967	3.2	2.6	–.6	2.5	–.6
1968	4.0	1.0	–3.0	1.0	–3.0
1969	4.8	1.2	–3.6	1.3	–3.5
1970	5.5	1.7	–3.8	1.8	–3.7
(4) Real Disposable Income Per Member of the Labor Force					
1967	$5,849	$5,828	$ –21	$5,824	$ –25
1968	5,983	5,962	–21	5,937	–46
1969	5,984	6,043	59	5,981	–3
1970	6,080	6,231	151	6,145	65
(5) Labor's Total Real Income ($ Billions)*					
1967	$404.2	$401.6	$–2.6	$401.6	$ –2.6
1968	428.0	422.0	–6.0	420.1	–7.9
1969	449.3	446.2	–3.1	440.1	–9.2
1970	456.0	461.0	5.0	449.1	–6.9
(6) Real Corporate Profits and I.V.A. ($ Billions)**					
1967	$ 68.1	$ 70.4	$ 2.3	$ 70.3	$ 2.2
1968	70.0	77.6	7.6	75.6	5.6
1969	63.3	70.5	7.2	64.7	1.4
1970	52.2	69.4	17.2	59.6	7.4
(7) Relative Income Shares of Corporate Profits (Percent)†					
1967	16.8%	17.5%	.7%	17.5	.7
1968	16.3	18.4	2.1	18.0	1.7
1969	14.1	15.8	1.7	14.7	1.6
1970	11.4	15.0	3.6	13.3	1.9
(8) Labor's Share of National Income (Percent)					
1967	71.5	71.1	–0.4	71.1	–0.4
1968	72.4	71.1	–1.3	71.3	–1.1
1969	73.9	72.6	–1.3	73.0	–0.9
1970	75.5	73.2	–2.3	73.8	–1.7

*Employee compensation deflated by consumer price index.
**Corporate profits and inventory valuation adjustment deflated by consumer price index.
†Corporate profits divided by employee compensation.

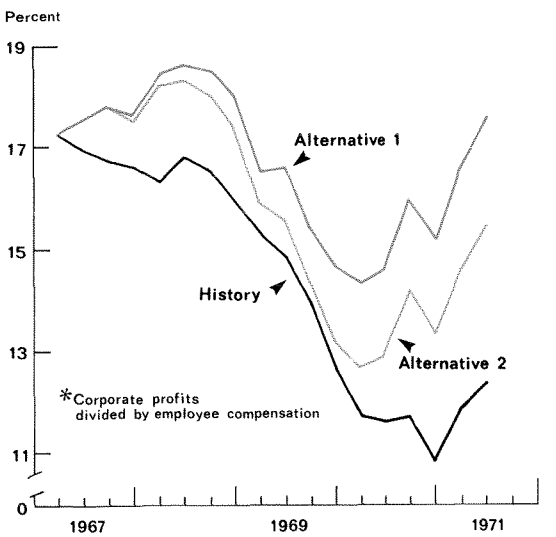
rate in the wage-control run as compared to its historical estimate. Nominal interest rates in the wage-control simulation do not decline as rapidly as prices, because price changes take some time—through adjustment delays in the model—to alter other economic and financial variables.

A substantial amount of the change in real GNP in this wage-control simulation is due to increases in real net exports and government expenditures. These factors may partly reflect some shortcomings in the basic model, for which adjustments are made in our second simulation.

Wage Control-Alternative 2 includes several of the same assumptions underlying the first alternative. We assume as before a constant 3-percent annual increase in nominal wages, and we continue the same adjustment to the cost of capital for producers' durable goods. But we also make two further adjustments. First, certain fiscal variables which are exogenous and fixed in current dollars are changed to reflect the lower prices generated by the incomes policy. Second, real exports, which are exogenous and thus not determined by the model, are kept at their historical values, while real imports, which are estimated by behavioral equations in the model, are adjusted to change only in response to changes in real income.

Chart 4

Profits Relative Income Share*



Both Federal grants-in-aid to state-and-local governments and Federal transfers to persons (other than unemployment-insurance benefits) are exogenous variables in the model. The amount of these expenditures is, in some way, affected by current prices, and allocations could decline somewhat in the wage-control situation as a result of the significantly lower prices. Consequently, we adjusted the amounts of these two variables so that real expenditures equaled their historical real magnitudes. In Alternative 2, our adjustment implies that federal fiscal policy is determined in real rather than current dollar magnitudes, which is the reverse of the assumption under Alternative 1.

With Federal grants reduced, Alternative 2 shows smaller values than Alternative 1 for state - and - local government expenditures, amounting to about $1 billion in 1969 and $2 billion in 1970 (Tables 2 and 3). Restricting Federal transfers to their historical real-dollar magnitudes results in relatively smaller real disposable income and hence relatively smaller consumption expenditures. In Alternative 2, real transfers to persons (other than unemployment insurance) are reduced by $1.3 billion in 1968, $2.9 billion in 1969 and $5.2 billion in 1970.

Export and import prices, as well as export volume, are exogenous variables in the model, while import volume is assumed to respond to relative prices and real income. Consequently, the decline in U.S. prices associated with an incomes policy should lead to substantial increases in net exports, since current-dollar exports remain at their historical levels and imports decline dramatically as U.S. prices fall relative to fixed foreign prices. But because of uncertainty regarding the world response to a decline in U.S. prices, we assumed that the incomes policy would be relatively neutral in its impact upon net exports, with no price effects on the quantities of internationally traded goods. Thus, there would be no gain in the U.S. foreign trade balance from the price ad-

TABLE 2

Real GNP and Components—Historical Values and Values Under Wage Control—Alternative 1
(Billions of 1958 dollars)

	1966	1967	1968	1969	1970
			Historical Values		
Gross National Product	658.1	675.2	706.6	725.6	722.3
Personal Consumption Expenditures	418.1	430.1	452.8	469.1	477.4
Business Fixed Investment	74.1	73.2	75.6	80.1	77.3
Residential Structures	21.3	20.4	23.2	23.7	22.2
Inventory Change	13.9	7.7	6.5	6.7	3.9
Net Exports	4.2	3.6	0.9	0.2	2.2
Exports	40.2	42.1	45.6	48.4	52.2
Imports	36.0	38.5	44.7	48.3	50.0
Government Purchases	126.5	140.2	147.7	145.8	139.3
Federal	65.4	74.6	78.1	73.4	64.4
State & Local	61.1	65.6	69.6	72.4	74.9
			Wage Control—Alternative I (Simulation period 1967-1970)		
Gross National Product	658.1	675.3	708.1	728.2	742.0
Personal Consumption Expenditures	418.1	429.7	452.5	470.2	485.7
Business Fixed Investment	74.1	73.1	74.0	74.5	71.0
Residential Structures	21.3	20.4	23.6	24.5	24.9
Inventory Change	13.9	7.6	5.3	4.1	5.9
Net Exports	4.2	4.1	4.1	6.5	10.6
Exports	40.2	42.1	45.6	48.4	52.2
Imports	36.0	38.0	41.5	41.9	41.6
Government Purchases	126.5	140.3	148.7	148.4	144.0
Federal	65.4	74.6	78.1	73.4	64.4
State & Local	61.1	65.7	70.6	74.9	79.6
			Change From Historical Values		
Gross National Product	0.0	0.1	1.5	2.6	19.8
Personal Consumption Expenditures	0.0	–0.3	–0.4	1.1	8.3
Business Fixed Investment	0.0	–0.1	–1.6	–5.6	–6.2
Residential Structures	0.0	0.1	0.4	0.8	2.7
Inventory Change	0.0	–0.2	–1.1	–2.5	2.0
Net Exports	0.0	0.5	3.2	6.3	8.3
Exports	0.0	0.0	0.0	0.0	0.0
Imports	0.0	–0.5	–3.2	–6.3	–8.3
Government Purchases	0.0	0.1	1.0	2.5	4.7
Federal	0.0	0.0	0.0	0.0	0.0
State & Local	0.0	0.1	1.0	2.5	4.7

vantage which could occur due to relatively lower domestic prices and the time delay involved in exchange-rate adjustments. Because of this assumption, net exports in Alternative 2 are close to historical values.

As a result of these adjustments, real GNP generally remains below historical values throughout the simulation, and the unemployment rate is higher than historical values from 1968 until 1971. (Table 1.) The inflation rate, on the other hand, remains substantially lower than historical rates; for example, it is 1.8 percent in 1970 compared with the actual 5.5-percent rate.

These results suggest that a wage-control policy may be successful in controlling the rate of inflation. But while reducing inflation, the growth in real incomes may be insufficient to maintain employment at historical levels during much of the period of controls.

Evaluation of the Incomes Policy Simulations

Our analysis has focused upon the consequences of a change from historical experience in average hourly wages. The findings are dependent upon the behavioral structure of the MPS model as well as the assumptions we have imposed along the way. If the model results are to have any applicability, they should be carefully interpreted within that context. To round-out our analysis, we should also consider the consequences of alternative assumptions, as well as other factors which could modify our conclusions.

Sensitivity to Alternative Assumptions

The model results suggest that a program which controls wage-rate increases can, for a time, control the rate of increase in final prices without direct price intervention. The impact of wage controls upon real output and employment, however, remains uncertain. Under equally feasible alternative assumptions, the impact of wage controls upon output and employment can differ considerably.

In Alternative 1, we assumed that Federal grants-in-aid and transfer payments were determined in terms of nominal dollars. Under this assumption, we obtained a sizable boost in such expenditures in terms of the real goods and services they commanded, because prices were considerably lower than in the real-life situation. Again, we assumed that a price advantage would occur in the U.S. relative to foreign-priced products, and this resulted in a sizable increase in net exports and thus a large stimulus to domestic activity. In the final analysis, Wage Control-Alternative 1 resulted in lower inflation than we actually experienced over the 1967-70 period, as well as a lower unemployment rate and a higher level of income.

In Alternative 2, by contrast, we assumed that Federal policy with regard to grants and transfers was determined in real terms rather than nominal. We adjusted the model so that these expenditures equalled their historical real-dollar magnitudes, and, in doing so removed a good deal of economic stimulus. We also assumed that the incomes policy would be relatively neutral in its impact upon net exports, so that internationally-traded goods would not be affected by price changes brought on by the wage policy. This assumption kept net exports in Alternative 2 close to historical values. As a result, prices were kept lower, but unemployment rose and real income and output declined relative to their historical values.

Linkage Between Money and Price Changes

In the MPS model of the U.S. economy, the percentage change in prices over the long-run tends to equal the percentage change in the money supply. Price reactions to changes in money begin with changes in interest rates, and these lead to changes in the cost of capital and in the demand for real output. Changes in demand for final products lead to changes in

TABLE 3

Real GNP and Components—Historical Values and Values Under Wage Control—Alternative 2 (Billions of 1958 dollars)

	1966	1967	1968	1969	1970
			Historical Values		
Gross National Product	658.1	675.2	706.6	725.6	722.3
Personal Consumption Expenditures	418.1	430.1	452.8	469.1	477.4
Business Fixed Investment	74.1	73.2	75.6	80.1	77.3
Residential Structures	21.3	20.4	23.2	23.7	22.2
Inventory Change	13.9	7.7	6.5	6.7	3.9
Net Exports	4.2	3.6	0.9	0.2	2.3
Exports	40.2	42.1	45.6	48.4	52.2
Imports	36.0	38.5	44.7	48.2	49.9
Government Purchases	126.5	140.2	147.7	145.8	139.3
Federal	65.4	74.6	78.1	73.4	54.4
State & Local	61.1	65.6	69.6	72.4	74.9
			Wage Control—Alternative II		
Gross National Product	658.1	675.1	704.0	715.5	718.7
Personal Consumption Expenditures	418.1	429.6	451.1	465.6	476.5
Business Fixed Investment	74.1	73.1	73.7	72.9	67.5
Residential Structures	21.3	20.4	23.6	24.3	24.9
Inventory Change	13.9	7.6	4.9	2.9	4.1
Net Exports	4.2	4.1	2.5	2.6	3.9
Exports	40.2	42.1	45.6	48.4	52.2
Imports	36.0	38.0	43.1	45.9	48.3
Government Purchases	126.5	140.3	148.3	147.3	141.9
Federal	65.4	74.6	78.1	73.4	64.4
State & Local	61.1	65.6	70.2	73.8	77.5
			Change From Historical Values		
Gross National Product	0.0	–0.1	–2.6	–10.1	–3.6
Personal Consumption Expenditures	0.0	–0.4	–1.7	–3.5	–0.9
Business Fixed Investment	0.0	–0.1	–1.9	–7.2	–9.7
Residential Structures	0.0	0.1	0.4	0.6	2.7
Inventory Change	0.0	–0.2	–1.6	–3.8	0.1
Net Exports	0.0	0.5	1.6	2.4	1.6
Exports	0.0	0.0	0.0	0.0	0.0
Imports	0.0	–0.5	–1.6	–2.4	–1.6
Government Purchases	0.0	0.1	0.6	1.4	2.6
Federal	0.0	0.0	0.0	0.0	0.0
State & Local	0.0	0.1	0.6	1.4	2.6

labor demand, and these bring about changes in wages which in turn become the major determinant of prices. The imposition of controls on wage increases thwarts the major channel by which monetary changes lead to price changes. The blockage of this channel, however, will not eliminate the pressures upon prices precipitated by the initial change in the money supply. If an incomes policy is to have any long-run success in keeping prices down, long-run monetary growth rates must be consistent with the price objectives of the incomes policy. In our simulations, the historical M_1 money supply grew at a 5.5-percent average annual rate over the 1967-70 period. This rate is too high to support for very long the zero or one-percent rate of inflation implied by our wage-growth assumption.

Policy Implementation and Resource Allocation

We have not touched upon the difficult problem of implementing the intended incomes policy, because our econometric model simply assumes that the intended policy is successful. The important point to bear in mind is that the average wage is not a policy variable which can be manipulated by policy-makers, being unlike tax rates, federal expenditures, or discount rates in this respect. To achieve a desired growth in the average wage rate, policy-makers must exert some control over individual sector or industry wages and, unavoidably, their actions in doing so will change the relative price structure which would otherwise exist. Such interference in the marketplace can distort the operation of the pricing system which, even in markets characterized by large power groups, has proved to be a relatively efficient means of allocating resources in a complex society.

Implementation of an incomes policy apparently will have to be flexible enough to consider individual cases, in order to allow markets to allocate resources freely. Policy-makers in this situation try to insure that the average wage level does not drift upward, while allowing movement in the structure of wages to guide resources efficiently. Although this intention is clear in principle, its implementation presents a formidable task and constitutes one of the greatest problems facing incomes policy.

The results of our model simulations depend upon the policy-maker's success in dealing with problems of implementation, which have been recognized by supporters of wage guidelines, such as Sidney Weintraub and Robert Solow:

> A proper policy would maintain the average wage movement within the average improvement norm. Simultaneously it would seek to achieve a strong measure of equity between wage earners of similar skills. It must also aim to direct labor into industries, occupation, and geographical areas of most urgent need. . . . Policy implementation is difficult though the general principles are less recondite.[17]

> The guideposts are intended to have an effect on the general level of money wages and prices, not on relative wages and relative prices. Most of the things we expect free markets to accomplish are real things, more or less independent of the price level. Ideally, the guideposts should permit markets to allocate resources freely, insuring only that the price level does not drift up in the process. . . . In practice, the guideposts will operate unevenly; relative prices and resource allocation may thus be affected. . . . One can hope that the uneven effects of guideposts will be of second order. . . . This inevitable unevenness in operation strikes me as the main weakness in the guideposts.[18]

Income Distribution: Profits and Wages

Our experience with incomes policies suggests that it will be impossible to maintain any form of wage and/or price programs unless the policy is generally regarded as equitable.[19] As we indicated, the real purchasing power of labor income is likely to fall relative to profits

when a wage-restraint policy is initiated. This unequal burden may stand in the way of successful policy implementation.[20]

Again, we have assumed restraints only on wages, largely because it seemed realistic to accept the falling-profits trend which actually occurred between 1967 and 1970. But in doing so, we have implicitly assumed that the resulting income distribution was acceptable to both labor and profit recipients, and to the extent that it is not true, the policy has little chance of success.

Summary and Conclusions

We have tried to answer the question: What impact would an incomes policy have upon U.S. economic activity? Our simulated incomes policy involved restricting the growth of the average wage rate in domestic nonfarm business to 3 percent a year, equal to the trend rate of growth in output per manhour in that sector since the late 1930's. We analyzed the impact of this policy on the U.S. economy from 1967.2 - 1971.2, employing simulation techniques in a version of the MPS model.

We presented results of the proposed wage-control program under two alternative sets of assumptions. The results generally suggest that a program which controls wage-rate increases can for a time control the rate of increase in domestic nonfarm prices without any direct intervention in prices. However, a wage-control program can have ambiguous effects on output and employment. The model results are sensitive to assumptions regarding the foreign sector's reaction to lower U.S. inflation, and regarding fiscal policy's impact on allocating funds (in either real or nominal terms).

Both alternative wage-control simulations suggest that labor's real income may decline relative to its historical value for some time after the institution of an incomes policy which restricts wage growth. In addition, labor's share of total income is likely to fall relative to the share of total income going to corporate profits. Under both simulations, however, business plant-equipment expenditures were somewhat less than their historical values, because nominal interest rates did not fall as rapidly as final prices while the real cost of capital remained higher than its historical cost. Finally, we should emphasize that we maintained the historical money growth and federal tax rates in our simulations, so that the results would reflect only the impact of keeping wage growth within the limits set by the long-run productivity trend.

FOOTNOTES

1. For example of forecasts, see **Sustaining a Balanced Expansion** (U.S. Congress: Congressional Budget Office, Washington, D.C., August 3, 1976), and the article, "UCLA Gives Forecast on Ford or Carter Economy," **Los Angeles Times,** September 24, 1976, p. III-13.

2. Ulman, Lloyd, and Flanagan, Robert J. **Wage Restraint: A Study of Incomes Policies in Western Europe.** Berkeley: University of California Press, 1971.

3. Okun, Arthur M. **The Political Economy of Prosperity.** New York: Norton, 1970.

4. Rasche, Robert H. "Simulations of Stabilization Policies for 1966-1970," **Journal of Money, Credit and Banking,** February 1973, pp. 1-25.

5. De Leeuw, Frank and Gramlich, Edward M. "The Channels of Monetary Policy," **Federal Reserve Bulletin,** June 1969, pp. 472-491, and Ando, Albert, "Some Aspects of Stabilization Policies, the Monetarist Controversy, and the MPS Model," **International Economic Review,** October 1974, pp. 541-571.

6. Nordhaus, William D., "Recent Developments in Price Dynamics," **The Econometrics of Price Determination,** Conference sponsored by the Board of Governors of the Federal Reserve System and Social Science Research Council, October 30-31, 1970, Washington, D.C. pp. 16-49.

7. For a detailed description of the price equation in the MPS model see George de Menil and Jared J. Enzler, "Prices and Wages in the FR-MIT-PENN Econometric Model," **The Econometrics of Price Determination, op. cit.,** pp. 277-308.

8. Consider a simplified adaptive expectations model in which expectations of a variable (x^e) are updated for each period by a fraction (a) of the discrepancy between the current observed value of the variable (x_t) and the value that had been accepted (x^e_t)

$$x^e_{t+1} - x^e_t = \alpha(x_t - x^e_t) \qquad (1) \quad \alpha < 1 \qquad (1)$$

Assume that the expected value of the variable, x_t^e, is some function of known variables; for simplicity, assume that

$$x_t^e = Bx_{t-1} \tag{2}$$

Then substitute (2) in (1),

$$x_{t+1}^e - x_t^e = \alpha(x_t - Bx_{t-1}) = \alpha x_t - \alpha B x_{t-1} \tag{3}$$

9. We may simplify and rewrite equation (2) in order to emphasize the lag patterns associated with the key price-determinant variables.

$$\ln P_t = .2901 \ln W + .0733\left(\frac{QUPD}{EPD}\right) - .0400\left(\frac{QUPD}{EPD}\right)_{-1} - .0014 \text{ TIME} - .0075 \sum_{i=0}^{7} \ln\left(\frac{XBNF}{LMHT}\right)_{-i} - .1174 + .7099 \ln P_{t-1} \tag{3}$$

The presence of the lagged dependent variable (P_{t-1}) means that we may replace that term by its equivalent, i.e., equation (3) lagged one period. This substitution will produce a variable in prices lagged two periods (P_{t-2}) which may also be replaced with equation (3) lagged 2 periods, and so on. In this way, the distributed lag for each independent variable in the equation may be determined.

The coefficients associated with the lagged values of the natural logarithm of wages are as follows. Let $\ln W = w$

$.2901w_t$	$.0372w_{-6}$	$.0047w_{-12}$	$.0006w_{-18}$
$.2509w_{-1}$	$.0264w_{-7}$	$.0034w_{-13}$	$.0004w_{-19}$
$.1462w_{-2}$	$.0187w_{-8}$	$.0024w_{-14}$	$.0003w_{-20}$
$.1038w_{-3}$	$.0133w_{-9}$	$.0017w_{-15}$	$.0002w_{-21}$
$.0737w_{-4}$	$.0094w_{-10}$	$.0012w_{-16}$	$.0001w_{-22}$
$.0523w_{-5}$	$.0067w_{-11}$	$.0009w_{-17}$	

10. Gordon, Robert J., "The Impact of Aggregate Demand on Prices," **Brookings Papers on Economic Activity,** No. 3, 1975.

11. Wallich, Henry C. and Weintraub, Sidney, "A Tax-Based Incomes Policy," **Journal of Economic Issues,** June 1971, pp. 1-19.

12. Duggal, Vijaya G. and Klein, Lawrence R., "An Approach to Disinflation," **Wharton Quarterly,** Winter 1974.

13. The simulation programs used with the MPS model enable us to generate historical values, make any changes from actual values we wish, and then compare the two simulation results to obtain an estimate of the impact of the change. The program first simulates each of the model equations separately, using historical values as independent variables, and records the errors for each equation. Next, the equations are simulated simultaneously in the full model, using values of the variables generated by the model and adding the error made by that equation which was previously calculated. Each equation, simulated in this way, will reproduce the actual values except for some rounding errors. In the next simulation a change is made to some variable, such as wages, and the single equation errors previously calculated are added to each equation. The difference between the last two simulations is the measured effect of the change in the last simulation.

14. Simulation results which leave capital costs unadjusted are shown below. The table provides the change from historical values for the various components of GNP, and may be compared with the results shown in Tables 2 and 3 in the text. For the following simulation, the only change from history which we imposed upon the model was to set the rate of growth of wages at 3 percent annually. The inflation results were similar to Alternatives 1 and 2, and the unemployment results were 3.8% (1967); 3.5% (1968); 3.5% (1969); 4.3% (1970).

Real GNP—Change from Historical Values (Billions of 1958 $)

	1967	1968	1969	1970
GNP	0.1	0.7	–2.3	9.4
Pers. Cons. Exp.	–0.3	–0.4	0.6	7.0
Business Fixed Inv.	–01	–2.0	–8.5	–13.3
Resid. Structures	0.1	0.4	0.8	2.8
Inventory Change	–0.2	–1.6	–4.5	–1.1
Net exports	0.5	3.3	6.7	9.1
Exports	0.0	0.0	0.0	0.0
Imports	–0.5	–3.3	–6.7	–9.1
Gov't. purchases	0.1	1.0	2.6	4.8
Federal	0.0	0.0	0.0	0.0
State & Local	0.1	1.0	2.6	4.8

15. See article in this **Review** by Kurt Dew, elaborating upon the formation of expectations.

16. It should be noted that this reduction in labor's income share is the result of the incomes policy assumption as well as the particular mix of monetary and fiscal policy that existed in the historical period. If policy-makers do not desire such a shift away from labor income, they could try to redistribute income toward labor through a tax or transfer program.

17. Weintraub, Sidney, **Keynes and the Monetarists,** New Brunswick, N.J.: Rutgers University Press, 1973.

18. Solow, Robert M., "The Case Against the Guideposts," **Guidelines** (Schultz, George P. and Aliber, Robert Z., editors), Chicago: University of Chicago Press, 1966.

19. On this point, see Anne Romanis Braun, "What is Incomes Policy and What Can it Achieve?" **Finance and Development,** April, 1975.

20. For this reason, a policy which restrains wages may be accompanied by some rules to restrain the growth in profits. A "Fair Shares" incomes policy has been suggested by Duggal and Klein (footnote 12). Under their proposal, nominal wages and profits both would increase at the same rate, which is equal to a trend rate of growth in productivity. This policy has the effect of stabilizing labor and profit shares in the distribution of national income. In particular, the extra funds collected from corporations would be plowed back (through federal programs) into the income stream, where they could generate additional income and jobs. Thus, Federal programs have the ability to counter the initial adverse effects on real wages created by incomes policies.