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A Conflict Model of Stagflation

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Ever since Robert J. Gordon [1976] argued for the recognition of both the supply-push models and analyses based on the struggle for income share, many mainstream theories have included the former in their explanation of stagflation (see, for instance, Blinder [1981] and Gordon [1981]). But the latter encounter difficulty because they generally lack formal structures that lend themselves to empirical testing (see, for example, Kahn [1975] and Sherman [1976]).

This paper attempts to answer some fundamental questions concerning the role of distribution conflict in the inflation and unemployment dynamics. It is useful to start with some models formulated along the lines of Lotka-Volterra-Goodwin (henceforth, L-V-G) which consider the struggle between the two populations—workers and capitalists—for income shares and its consequences for movements of profits, wages, and unemployment. The L-V-G model was generalized by Medio [1980] and extended in Desai [1973], Shah and Desai [1981], and Costrell [1984]. Our model is closer to Desai [1973] but differs in its treatment of capitalist saving, investment behavior, pricing policy, and worker anticipated inflation. To simplify the estimation problem we ignore excess capacity and increasing returns. Also, to shed light on the origin of stagflation it was found necessary to relate the model to various hypotheses regarding the long-run Phillips curve. This was accomplished through a variable parameter model that allows structural changes over time. The relationship between the model and conventional demand and supply factors also needs examination.

Answers to the questions posed can be most fruitfully approached by an empirical investigation. The results appear to support the hypothesis that, for the U.S. economy, a positively sloped Phillips curve [i.e. higher unemployment with rising inflation] is relevant not only for the recent period but very likely to the 1960–1969 period as well. The main cause for the presence of this phenomenon appears to be the dominance of wage-push over the profit-push. During the 1948–1969 period workers' push for higher income share already exceeded what the productive capacity of the economy could permit. During the 1970's, continued demands greatly exceeded a more restricted paying capacity that results from the changing structure of the economy and exogenous supply shocks.

The outline of this paper is as follows: The model and its implications on various inflation-unemployment scenarios are formulated in section I. The relationship between the conventional demand and supply factors and our model is treated in section II. Empirical results are presented in section III and discussed in section IV. Finally, a summary and conclusion is given in section V.

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I. THE MODEL

Consider a simplified world consisting of a worker class which earns wages only and a capitalist class which earns profits only. Assuming workers do not save, Kaldor's well-known model implies the following short-run link between the profit share and the investment share:

$$\pi = (1/s_c)(I/Y) \tag{1}$$

where π is the profit share; I, the nominal net investment, Y, the nominal net income; and s_c, the capitalists' saving propensity.

Let O be the real output; K, the nominal value of the capital stock; P, the general price level; P_K, the price of capital goods; C, the real capital stock; and σ, the constant real capital-output ratio (i.e. $\sigma = C/O$). Using (1) and noting that $Y = PO$ and $K = P_K C$, we obtain

$$\dot{O} = \frac{s_c \pi}{\sigma} \frac{P}{P_K} - \dot{P}_K \tag{2}$$

where $\dot{O} = dO/O$ and so on.

Let ℓ be the employment rate in the labor force, i.e. $\ell = L/N$ where L is employment and N, the labor force; and λ and n represent the percent change in labor productivity and in the labor force, respectively. Since $\dot{\ell} = \dot{O} - \lambda - n$, where $\dot{O}$ is taken from (2), we get

$$\dot{\ell} = \frac{s_c \pi}{\sigma} \frac{P}{P_K} - \dot{P}_K - \lambda - n. \tag{3}$$

We assume further that firms maximize the rate of growth of internal savings to finance investment subject to a minimum growth rate of dividends. To achieve this end, they adopt, *inter alia,* a pricing policy that allows them to attain a target rate of return from which some proportional desired mark-up rate on unit cost can be determined. Other things being equal, the greater the desired level of investment, the greater the target rate of return and the price level have to be set, hence the higher the mark-up rate (Scherer [1970], Blair [1975], Wood [1975], and Eichner [1976]). This may be called the price theory of the mark-up, or more precisely the investment theory of the mark-up.

As in Desai [1973], we propose a mark-up on unit labor cost:

$$m = \frac{P}{(wL/O)} \tag{4}$$

where m is the desired mark-up and w, the money wage rate. Notice that the profit share π and the labor share ω are $1 - (1/m)$ and $1/m$, respectively.

It follows from (4) that

$$\begin{aligned} \dot{\omega} &= -\dot{m} \\ &= -(m - 1)\dot{\pi} \end{aligned} \tag{5}$$

An increase in the mark-up will lower the wage share. And for a given mark-up factor ($m > 1$), a lower wage share necessarily raises the profit share. Thus, mark-up is a means by which capitalists can improve their income share.

For the workers, their only influence on income share is through wage demands which, we assume, depend on the employment rate and inflationary expectations, i.e.

$$\dot{w} = -\beta_0 + \beta_1 \ell + \beta_2 \dot{P}^e \tag{6}$$

where P^e is the expected price level.

A comment on the coefficients is in order. $-\beta_0$ reflects the demand for a relative rise in minimum income or standard of living (if $-\beta_0 > 0$) even when workers have no work and no inflationary expectations. It includes an increase in unemployment compensation benefits, the legal minimum wage rate, welfare payments, other fringe benefits, pension benefits, and the like. These arise out of society's concern for individuals' welfare and dignity, workers' expectations of an ever-rising standard of living and their claim for a fair share in it. Note that secondary effects of some adverse external shocks could influence $-\beta_0$ if workers believe these events have undermined the attainment of a desired increase in their standard of living. Thus, $-\beta_0$ can be called the exogenous component of the wage demand. β_1 represents the rate of change in the wage growth demanded by workers when the labor market gets tighter (Medio's demand effect) and may be interpreted as the demand-induced component of the wage-push. And β_2, of course, is the coefficient of money illusion with $0 \leq \beta_2 \leq 1$.

Now consider workers' anticipated inflation. Here we adopt a simple adaptive expectation scheme in which the inflationary expectations adjust instantly to the realized rate of inflation so that $\dot{P}^e = \dot{P}$, i.e. workers' anticipation of inflation in each period turns out to be correct thereby generating no pressure for change in the inflation rate. But whether they can actually raise the wage rate depends on β_2, which now measures the ability to actualize their expectations.

Since we can write $\dot{P} = \dot{m} + \dot{w} - \lambda$ on the basis of (4) and use (5) to substitute for m we obtain

$$\dot{P} = -\dot{\omega} - \beta_0 + \beta_1 \ell + \beta_2 \dot{P} - \lambda. \tag{7}$$

Regroup terms in (7) and (3), insert a time variable and let $\alpha = \dot{P}$, $\alpha_K = \dot{P}_K$, $\epsilon_1 = (1 - \beta_2) \cdot \alpha + \lambda + \beta_0$, $\delta_1 = \beta_1$, $\delta_2 = (s_c/\sigma)(P/P_K)$, and $\epsilon_2 = \delta_2 - \alpha_K - \lambda - n$, these equations become:

$$\frac{d\omega}{dt} = (-\epsilon_1 + \delta_1 \ell)\omega \tag{8}$$

$$\frac{d\ell}{dt} = (\epsilon_2 - \delta_2 \omega)\ell \tag{9}$$

The reader should notice, the system represented by (8) and (9) is of the same form as the L-V-G. Although Goodwin [1972] refers to the relationship between labor and capital as a symbiosis, the relationship between the employment rate and the wage share resembles that between a prey and a predator. Thus, if the actual wage share increases then employment suffers since the latter depends on the profit share.

It can be proved that, apart from the equilibrium at the origin, the equilibrium values or asymptotical averages[1] are

$$\omega^* = \epsilon_2/\delta_2 \quad \text{and} \quad \ell^* = \epsilon_1/\delta_1. \tag{10}$$

Each equilibrium point (ω^*, ℓ^*) forms a center around which the system fluctuates cyclically along the closed curves.[2] The equilibrium unemployment rate u^*, which equals one minus ℓ^* and is derived from some steady state inflation rate, is thus equivalent to the celebrated "natural rate of unemployment" introduced by Milton Friedman [1968].

So far we have assumed unchanged technology with a constant degree of conflict between capital and labor in each period. Now consider changing technology, structure, and possibly changing intensity of conflict as might materialize when we move from one period to the next. In that case, the system parameters might alter and the discrete change in equilibrium values will be

$$\Delta\ell^* = \Delta(\epsilon_1/\delta_1) = (\epsilon_1/\delta_1)(\dot{\epsilon}_1 - \dot{\delta}_1); \tag{11}$$

$$\Delta\omega^* = \Delta(\epsilon_2/\delta_2) = (\epsilon_2/\delta_2)(\dot{\epsilon}_2 - \dot{\delta}_2). \tag{12}$$

Thus

$$\Delta\ell^* \gtreqless 0 \quad \text{if and only if} \quad \dot{\epsilon}_1 - \dot{\delta}_1 \gtreqless 0 \tag{13a}$$

i.e. if and only if

$$\left\{\frac{(1-\beta_2)\alpha}{\epsilon_1}[\dot{\alpha} + (1 \dot{-} \beta_2)]\right\} + \left(\frac{\lambda}{\epsilon_1}\right)\dot{\lambda} \gtreqless \dot{\beta}_1 - \left(\frac{\beta_0}{\epsilon_1}\right)\dot{\beta}_0 \tag{13b}$$

and

$$\Delta\omega^* \gtreqless 0 \quad \text{if and only if} \quad \dot{\epsilon}_2 - \dot{\delta}_2 \gtreqless 0 \tag{14a}$$

i.e. if and only if

$$\left(\frac{\delta_2}{\epsilon_2} - 1\right)(\dot{s}_c + \alpha) \gtreqless \left(\frac{\delta_2}{\epsilon_2} - 1\right)(\alpha_K + \dot{\sigma}) + \frac{\alpha_K}{\epsilon_2}\dot{\alpha}_K + \frac{\lambda}{\epsilon_2}\dot{\lambda} + \frac{n}{\epsilon_2}\dot{n}. \tag{14b}$$

The terms in the left hand side (LHS) of (13b) form what shall be called the profit-push. First, $1 - \beta_2$ stands for the capitalists' ability to raise the profit share through inflation at each given mark-up factor.[3] Second, since $\beta_2\alpha$ is the wage claim due to inflation, $(1 - \beta_2)\alpha$ denotes the price increase that goes to profit. Finally, improvement in labor productivity is the function of the capitalists and can be effected through technical and organizational innovations. Its right hand side (RHS) contains elements of the wage-push explained earlier. Thus, if the LHS of (13b) is greater than (equal to, less than) the RHS, we say that the profit-push dominates (balances, is dominated by) the wage-push. The condition gives rise to three scenarios related to the long-run Phillips curve which could be defined as the locus of equilibrium unemployment rates for given steady state inflation rates.

(a) Scenario 1: The neo-Keynesian long-run inflation-unemployment trade-off which implies a negatively sloped long-run Phillips curve. The necessary and sufficient condition for this to occur is that $\dot{\alpha} > 0$ and the dominance of the profit-push over the wage-push.

(b) Scenario 2: The stagflation hypothesis in which there exists a direct relationship between the equilibrium unemployment rate and the steady state inflation rate, i.e. a positively sloped long-run Phillips curve. The necessary and sufficient condition of its emergence is $\dot{\alpha} > 0$ and the dominance of the wage-push over the profit-push.

(c) Scenario 3: Friedman's accelerationist hypothesis in which the equilibrium unemployment rate remains at the original level despite an increase in the steady state inflation rate, i.e. a vertical long-run Phillips curve. The necessary and sufficient condition is $\dot{\alpha} > 0$ and the balance between the two forces.

Conditions (14b) allows us to answer the question whether what labor demands can be satisfied without impact on inflation and unemployment. Unlike the realized share which

depends on the interaction between labor's own behavior and capital's responses (cf. equations (8) and (9)), the equilibrium labor share is determined by many technological and supply-side factors that are outside labor's control. In fact, the latter tends to increase with higher general prices and the rate of capitalists' saving and conversely, it tends to decrease with higher capital good prices, more capital intensive technology as well as with greater labor productivity growth and labor supply. Thus, paradoxically, what labor demands in higher wages will not affect its equilibrium wage share but only influences its employment at equilibrium.

II. DEMAND AND SUPPLY FACTORS

Conventional explanations of stagflation focus on the supply-push phenomenon and the secondary supply-shift effects of demand-pull inflation. Both processes can be incorporated into our analysis.

In general, components of aggregate demand that contribute to inflation or inflationary expectations can also influence unemployment through parameters of (13b).

The exogenous increase in food and energy prices or any component of total unit costs such as cost-raising government regulation can increase α and α_K. The food and energy inflation has an indirect effect on nonfood nonenergy prices through the cost-of-living-adjustment clauses in wage contracts. These clauses are equivalent to an adjustment of anticipated inflation for the influence of the supply shocks. The result is the upward-shifting of the wage demand curve when $-\beta_0 < 0$, or worse, the curve may rotate counter-clockwise with $-\beta_0 > 0$ and $\beta_1 < 0$. The energy inflation may also lower λ.

Many economists contend that rising minimum wages, payroll taxes, and unemployment compensation benefits contribute to the development of the inflationary recessions. For instance, the job turnover hypothesis posits that jobs and workers are highly differentiated so that unemployed workers require time to find the job that is best for them. But the progressive income tax system, coupled with the rising unemployment compensation benefits, tends to discourage the unemployed from actively looking for jobs or to prolong job search. At the same time, it discourages the employed from offering more work hours and efforts. It can be shown that an increase in the legal minimum wage rate and payroll taxes would raise minimum wage income claims if workers are concerned with after-tax income. Moreover, as has been mentioned in the previous section, any change in transfer payments must affect $-\beta_0$.

The shift in the composition of the labor force toward adult women and teenagers can influence n if n is disaggregated for different groups. However, n affects only equilibrium income share. Nevertheless, since these groups often lack skills required by employers the shift could lower λ contributing to higher equilibrium unemployment rate.

III. EMPIRICAL FINDINGS

Annual data from 1948 to 1981 were used in estimating the wage demand equation (6) and other parameters. In order to easily see the change in the equilibrium unemployment rate and the equilibrium wage share, it is necessary to divide the last three decades into subperiods. For it is possible that one scenario may fit one subperiod and another scenario, another subperiod. The choice of 1970–1981 is based partly on the mainstream evidence on supply shocks and partly on the Chow test.

The wage rate is measured by compensation per hour in the private business sector; the general price, by the consumer price index; the price of capital goods, by the producer price index; the employment rate, by one minus the civilian unemployment rate; labor productivity,

TABLE 1
Estimated Coefficients of the Wage Demand Equation,[a] 1948–1981

Period	Equation	$-\beta_0$	ℓ	$\dot{P}^e$	$\bar{R}^2$	D-W	F-statistic
1948–1959	(1.1)	−59.88[b]	0.65[b]	0.71[b]	0.73	2.53	14.74[b]
		(27.69)	(0.29)	(0.17)			
1960–1969	(1.2)	−27.42[b]	0.33[b]	0.70[b]	0.96	2.85	105.34[b]
		(10.30)	(0.11)	(0.09)			
1970–1981	(1.3)	29.65[b]	−0.26[b]	0.36[b]	0.92	1.97	54.62[b]
		(9.51)	(0.10)	(0.11)			
1948–1969	(1.4)	−48.50[b]	0.55[b]	0.66[b]	0.76	2.17	32.82[b]
		(16.60)	(0.18)	(0.14)			
1948–1981	(1.5)	−24.73[b]	0.30[b]	0.60[b]	0.81	2.04	70.14[b]
		(12.43)	(0.13)	(0.05)			

[a]Equation (6) in section I.
[b]denotes significance from zero at 5 percent level or better. Figures in brackets are standard errors. $\hat{\beta}_2$ is significantly different from unity at 5 percent level or better for all periods except 1948–1959. D-W is the Durbin-Watson statistic.

by output per hour of all persons in the private business sector; n, by the growth in the civilian labor force; the nominal profit share, by one minus the ratio of the total compensation of employees to the national income; and s_c, by the ratio of total gross business saving to total profit-type (profit, rental, interest, proprietors) income after tax.

Regression results are presented in table 1. We estimated the equations by ordinary least squares with autocorrelation correction using the Hildreth-Lu scanning technique. All the estimated coefficients and F-statistics are significant at 5 percent level or better. The Durbin-Watson statistics are in the right ranges. Coefficients of equation (1.3) reveal a significant break with past. Here, the signs of $-\beta_0$ and β_1 are reverse of those of equations (1.1) and (1.2). The Chow test shows that coefficients of equation (1.2) are not significantly different from those of (1.1) but those of (1.2) and (1.4) do differ significantly from those of (1.3). Consequently, we can divide the period 1948–1981 into three subperiods: 1948–1959, 1960–1969, and 1970–1981. In order to draw inference about the relationship between the equilibrium unemployment rate and inflation rate we need the 1948–1959 period as a base. The calculation of the equilibrium unemployment rates and the equilibrium wage shares is reported in table 2 and table 3, respectively.

TABLE 2
Estimated Equilibrium Unemployment Rates, 1948–1981

Period	α (%)	$(1-\beta_2)\alpha$ (%)	λ (%)	β_0 (%)	ϵ_1 (%)	δ_1 $(=\beta_1)$	ℓ^* (%)	u^* (%)	u (%)
1948–1959	2.28	0.66	3.28	57.88	61.82	0.65	95.3	4.7	4.6
1960–1969	2.31	0.70	2.90	27.42	31.02	0.33	94.9	5.1	4.8
1970–1981	7.92	5.05	1.47	−29.65	−23.13	−0.26	90.0	10.0	6.4
1948–1969	2.30	0.79	3.17	48.50	52.46	0.55	95.4	4.6	4.7
1948–1981	4.29	1.73	2.50	24.73	28.96	0.30	95.6	4.4	5.3

Note: Values of β_0, β_1, and β_2 are taken from table 1; and λ from *Economic Report of the President,* (table B-55, p. 225, and table B-41, p. 209). $\epsilon_1 = (1-\beta_2)\alpha + \lambda + \beta_0$, $\ell^* = \epsilon_1/\delta_1$, $\delta_1 = \beta_1$, and $u^* = 1 - \ell^*$.

TABLE 3
Estimated Equilibrium Wage Shares, 1948–1981

Period	α_K (%)	n (%)	σ	s_c (%)	P/P_K^d	ϵ_2 (%)	δ_2 (%)	ω^* (%)	ω (%)
1948–1959	1.98	1.19	4.95[a]	60.3	0.93	4.85	11.3	42.9	68.0
1960–1969	1.39	1.68	2.60[a]	68.0	0.99	19.93	25.9	76.9	70.8
1970–1981	8.12	2.51	3.00[b]	81.8	1.01	15.40	27.5	56.0	74.7
1948–1969	1.70	1.41	3.75[a]	64.2	0.92	9.52	15.8	60.3	69.3
1948–1981	3.97	1.80	3.40[c]	70.0	0.98	11.93	20.2	59.1	71.2

[a]Average incremental capital-output ratio (ICOR) from United Nations (part 2) and Kendrick (table 4-4, p. 100).
[b]Assumed.
[c]Average of 1970–1981 and 1948–1969 values.
[d]P and P_K are averages of the respective price indice of each period (1967 = 100).

Note: Values of α_K, n, P, P_K, and s_c are calculated from *Economic Report of the President,* (table B-60, p. 232; B-29, p. 196; B-52, p. 221; B-57, p. 192; B-21, p. 187) and *Survey of Current Business,* various years. $\epsilon_2 = \delta_2 - \alpha_K - \lambda - n$, $\delta_2 = (s_c/\sigma)(P/P_K)$, and $\omega^* = \epsilon_2/\delta_2$.

IV. DISCUSSION

Before discussing the implications of the results, a remark on the estimate of β_2 is in order. Table 1 shows that it is significantly different from unity for all periods except 1948–1959. It indicates that workers have not been able to translate their expectations into action although, by assumption, they could predict the inflation level. There are two reasons for this. On the one hand, if business yields to wage demands without raising prices a fall in the profit share and investment level will follow. If, on the other hand, firms raise prices to maintain a constant profit share, they would suffer market losses to competitors. Competition puts considerable pressure on firms to resist workers' wage demands. This generally implies that $\beta_2 < 1$ and the size of β_2 is determined by the extent of domestic and international competition and the gap between the actual and equilibrium unemployment rate. Studies on implicit and explicit agreements between firms and workers lend considerable support to the above argument. In the labor markets, implicit contracts between workers and firms provide rewards for the former to remain in existing jobs even though fluctuation in the composition of demand may raise the wage rate of the jobs available elsewhere. These lags in the adjustment of the wage rates happen even in the absence of unions (Okun, 1975).

Although only one-quarter of all workers in the private sector belongs to labor unions, the wage patterns set by union contracts have an important effect on non-unionized workers' income as well (see, for instance, Ozanne, 1974). Contract characteristics account for the lack of perfect adjustment of wages to inflationary expectations. First, the majority of union contracts last for three years, during which time the stipulated wage rate remains in effect regardless of the change in prices. Second, firms resist full price escalation in the cost-of-living-adjustment clause to avoid a secondary wage boost caused by some exogenous forces (e.g. higher energy prices) without accompanying commensurate increase in demand for their products. Finally, contracts are never negotiated on the basis of fluctuation in the composition of aggregate demand. Unions usually prefer stable wage rate no matter what happens to product sales. Thus, only partial cost-of-living escalation in wage bargains has been observed with respect to inflation (Hall and Lilien, 1979).

As shown in table 2, the realized average unemployment rate is very close to the

equilibrium rate for the 1948–1959 period but slightly lower for 1960–1969. For 1970–1981 the situation is entirely different. The equilibrium rate of 10.0 percent is rather high compared to the actual rate of 6.4 percent, indicating that a fundamental change in the economic structure was at work.[4] The change—which could have been partly induced by external shocks—was so drastic that the wage demand curve rotates counter-clockwise reversing the sign of $-\beta_0$ and β_1 (see table 1). Before 1970, wage demands accelerated as the economy approached full employment. During 1970's, wage demands kept on rising even when the employment rate fell. The value of β_2, which was only half of that of the previous subperiods, indicates that the workers' ability to catch up with inflation had been significantly reduced.

Table 4 shows that, for 1948–1969, the decrease in the demand-induced component of wage-push almost neutralized the rise in the exogenous component. However, on balance, the estimated LHS of (13b) is still less than its estimated RHS as expected. For 1960–1981, the increase in the exogenous wage demand component was overwhelming in spite of the deceleration in the demand-induced component.[5] It appears that wage increases had less to do with the demand conditions in the labor market in the 1970's than in the previous periods. Although the inflation rate and the ability of the capitalists to raise the profit share had gone up tremendously, the profit push was seriously weakened by the decline in the growth of labor productivity. At any rate, even without the latter, the profit push did not amount to much in countering the wage-push.

The realized average wage share is significantly greater than the equilibrium for all subperiods except 1960–1969 (see table 3). The equilibrium labor share rose from 42.9 percent during 1948–1959 to 76.9 percent during 1960–1969 but fell to 56.0 percent during 1970–1981. At the same time, the actual share rose steadily from 68.0 percent to 74.7 percent. During 1960–1969, all factors favored the rise in the equilibrium labor share except the growth in the labor force. During 1970–1981, however, besides the labor force, the rising capital-output ratio and the acceleration in the price of capital goods more than offset the rise in the capitalists' saving rate and caused a fall in the equilibrium share (see table 4). Here, we could consider the equilibrium wage share as representing the ability of the economy to pay for labor demand since the former is determined mostly by technological conditions, supply of labor and investible funds, and conditions in the investment goods market. In that case, we might say that throughout the 1948–1981 period, what labor demanded was always higher than the economy's

TABLE 4
Factors in the Changing Equilibrium Values, 1948–1981
(In percent)

Condition	$\frac{(1-\beta_2)\alpha}{\epsilon_1}\dot{\alpha}$	$\frac{\lambda}{\epsilon_1}\dot{\lambda}$	$\frac{(1-\beta_2)\alpha}{\epsilon_1}(1-\dot{\beta}_2)$	$\dot{\beta}$	$-\frac{\beta_0}{\epsilon_1}\dot{\beta}_0$
(13b)[a]	0.014	−0.62	0.05	−49.2	49.3
(13b)[b]	5.49	−4.61	2.50	−78.8	138.6

Condition	$\frac{\delta_2}{\epsilon_2}-1$	$\dot{s}_c$	α	α_K	$\dot{\sigma}$	$\frac{\alpha_K}{\epsilon_2}\dot{\alpha}_K$	$\frac{\lambda}{\epsilon_2}\dot{\lambda}$	$\frac{n}{\epsilon_2}\dot{n}$
(14b)[a]	1.33	12.8	2.28	1.98	−47.5	−12.2	−7.9	10.1
(14b)[b]	0.30	20.3	2.31	1.39	15.4	33.8	−7.2	4.2

[a]The rate of change between 1948–1959 and 1960–1969.
[b]The rate of change between 1960–1969 and 1970–1981.

Note: Computation is based on tables 2 and 3.

paying ability. But what distinguishes the 1970's from the previous periods is that while ability to pay rose during the latter it fell during the former in consequence of supply shocks. Thus, the fundamental change in the economic structure was no longer conducive to the continued wage-push. Since the latter did not slacken but actually accelerated, greater stagflation was the concomitant price.

Results in table 2 suggest that steady state inflation and equilibrium unemployment rates have gone up for both the periods 1960–1969 and 1970–1981 and possibly 1948–1959 as well. It appears that we faced a gently rising, almost imperceptible, long-run Phillips curve as early as 1960–1969. Notice that in this period the demand-induced wage claims became less and less important. However, workers' ability to get what they wanted remained strong compared to their adversaries'. This means that with prices rising just a little, capitalists must have absorbed most of the wage claims, which resulted in a decline in their actual profit share from 32.0 percent to 29.2 percent. During 1970's, however, the curve became much steeper. The exogenous component of the wage-push now grew precipitously. Although the demand-induced wage-push became negative, and labor's ability to catch up with inflation was cut in half, the improvement in the capitalists' ability to raise the profit share was not sufficient to offset the increase in the exogenous wage claims. The result was a further fall in the actual profit share. It is interesting to note that Milton Friedman [1977] also discerned the same positively sloped Phillips curve in his study of seven industrialized countries. However, his explanations focus chiefly on capital's side; the effects of accerelating inflation were viewed as reducing investment and thereby hindering the growth in labor productivity and retarding the adjustments to new market conditions.

Our interpretation of the wage-price spiral and the concomitant stagflation concentrates on both sides of the conflict although it appears that labor's demand was more than the economy could satisfy at constant prices.[6] The conflict is induced by the society's changing expectation regarding economic progress and supposedly guaranteed rising standard of living as a result of that progress. Inflation and unemployment and their fluctuations are symptoms of the struggle over how the national income and the annual increase in productivity are to be distributed to fulfill this expectation. Government is subject to pressure from both groups and thus vacillates from policy of helping capital to helping labor and vice versa. In either case, more money, credit and government expenditures have to be injected into the economy to raise workers' income and employment and business investment simultaneously.[7] In this way, demand-pull inflation being a reflection of "demand for inflation" by competing groups is thus only a symptom of the disease, not the cause. Such a view is not new, however, as it has been noted and propounded by many authors during 1960's and early 1970's.[8]

V. SUMMARY AND CONCLUSION

In this paper we propose a model with a structure similar to Lotka-Volterra-Goodwin model to study inflation and unemployment resulting from the distributional struggle between labor and capital. The variable parameter model enables us to estimate changing equilibrium unemployment rates and equilibrium labor shares. Empirical evidence for the U.S. shows that the 1960–1981 period was marked by a long-run Phillips curve which was first only very slightly upward sloping before it became steeper, as predicted by conventional analysis. The main cause of this phenomenon was the dominance of wage-push over the profit-push. In terms of deviation from the equilibrium wage share, during 1948–1969 workers already received more than what the growing economy could afford. However, during 1970's the actual wage demands greatly

exceeded the paying capacity of the economy whose expansion was impeded by the supply shocks. These results generally agree with those reached by conventional models. However, our interpretations differ from the latter in one important respect. In general, mainstream theory considers the demand factors as the main explanations for inflation in the 1950's and 1960's and the supply factors for stagflation in 1970's. Our model suggests that even if we allow for changing technology and economic structure, the relationship between unemployment and inflation depends on the outcome of the conflict between labor and capital, i.e. on the balance between the wage-push and the profit-push. If the conflict intensifies to a degree that it takes on the character of a Marxian class struggle the system will necessarily experience a crisis in which no orthodox institutional containment, such as income policies, will be effective. To prevent such a situation, it is important not only to find a balance between the two conflicting forces while urging both sides to restrain their expectations and demands in the face of less favorable supply conditions such as inadequate savings and investment, shortage of raw material resources, lagging technology and, above all, a slowdown in the growth of labor productivity.

FOOTNOTES

1. See John G. Kemeny and J. Laurie Snell [1978], p. 29
2. Suppose $\wp$ is measured on the vertical axis and ω on the horizontal axis then these closed curves which are drawn according to different initial conditions $(\omega_0, \wp_0)$ will move in a clockwise direction. If the system is not at equilibrium any external shocks simply move the system from one curve to another. They all have the same periodic motion but their amplitude gets larger when the disturbance is greater, i.e. the variation in the wage share and the employment rate depends on how far their starting values deviate from the equilibrium. For details on the cyclical behavior of the system, see Goodwin [1971], Desai [1973], and Kemeny and Snell [1978].
3. This can be seen by rearranging (7) to get $\dot{\pi} = [1/(m - 1)][\beta_0 - \beta_1\wp + (1 - \beta_2)\alpha + \lambda]$.
4. It should be recalled that the full-employment unemployment rate was estimated by the U.S. Council of Economic Advisors to be 4 percent for 1955 and between 4.9 percent and 5.5 percent in 1977. The natural rate of unemployment was estimated by George L. Perry [1977], Peter K. Clark [1977], Jeffrey Perloff and Michael Wachter [1979], and Gordon [1981] for the end of 1970's to lie between 5.5 to 6 percent. James Tobin [1972] also believed that the natural rate might fall within the range from 5 to 6 percent. Even Keynes himself doubted that unemployment could be brought permanently below 5 percent (cited in James A. Trevithick [1977], p. 60). Our equilibrium unemployment rate of 10 percent is quite high compared to other estimates but it is to be expected from a structurally unstable system. The latter means that a slight change in parametric values makes the system explode, namely a sharp rise in equilibrium unemployment rate to 10 percent and a drastic fall in equilibrium labor share to 56 percent. This is perhaps the major drawback of our model which, unfortunately, is not serious since we are not concerned with growth cycles.
5. Data gathered by Lester C. Thurow reveal that the distribution of earnings among persons was becoming more unequal during the postwar period. Only the enactment of the income transfer programs made the distribution of per capita household income less unequal.
6. Workers do not simply defensively respond to any threatened reduction in the labor share. They never cease attempting to improve their relative positions as revealed by Samuel Gompers's statement: "I would not want any man to believe that our movement is satisfied. There is not anything satisfying in what we have accomplished. It is gratifying but simply whets our appetite for better and still better things." (Quoted in Ulman). On the business side, the Confederation of British Industry (CBI) presented a position paper in the Conference of the National Economic Development Office (NEDO) in January 1971 telling the government that "wage inflation was accelerating a crisis by making less money available for investment," and that "many companies have been relying on capital to meet wages." (Quoted in Charles Levinson, p. 277).
7. Basil J. Moore provides evidence that money supply is endogenous rather than exogenous. He finds the Federal Reserves to be generally more responsive to the needs of the financial system and particularly more accommodative to workers' demand for wage increases than commonly thought.

8. For instance, among those authors are Gardner Ackley [1961], K.F. Zawadski [1965], Jan Pen [1971], Dudley Jackson et al. [1972], Robert Ozanne [1974], Lloyd Ulman [1974], Gardiner Means [1975], Robert J. Gordon [1975], and James E. Meade [1982].

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