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TRADE UNION POWER, LABOR MILITANCY AND WAGE INFLATION: A COMPARATIVE ANALYSIS

Douglas A. Hibbs, Jr.

CENTER FOR INTERNATIONAL STUDIES
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Cambridge, Massachusetts 02139

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Douglas A. Hibbs, Jr.
Department of Political Science
Massachusetts Institute of Technology

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Broadly speaking two views have dominated the literature on postwar wage and price inflation: 'demand-pull' and 'cost-push.' (2) Admittedly, the distinction is somewhat artificial, probably more so now than in the past. Indeed, the empirical results of excess demand models of inflation are easily rationalized in cost-push or 'sociological' terms -- a point I pursue further in the main body of the paper. Conventional, demand-pull inflation models imply that the percentage rate of change of money wages depends essentially on the level of, and in some models the rate of change of, excess demand for labor. The principal theoretical controversy in the demand-pull literature (and one that has obvious policy implications) is whether there is a stable, long-run trade-off between the demand for labor (usually proxied by a nonlinear function of the measured unemployment rate) and the rate of wage and/or price inflation. The neoKeynesian

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(1) A third view should also be acknowledged: the monetarist, quantity theory. Models representing the quantity theory framework are not examined in this paper. However, see the comparative study by Nordhaus, 1972, who concludes "The strict monetarist hypothesis is rejected whenever the evidence is sufficient." (p. 439)

position is that there is a long-run unemployment-inflation trade-off (although many have abandoned this position in the light of recent experience), whereas, the neoclassical stance is that any such trade-off is merely a short-run, transitory phenomenon due to lags in adjustment between expected and actual rates of inflation.

International factors aside, cost-push theories of wage inflation usually take a social conflict or collective bargaining orientation to wage formation and point to the influence of 'sociological' variables -- especially trade-union militancy or labor 'pushfulness.' At the core of the cost-push view is the idea that trade-union action exerts significant upward pressure on the rate of change of wages independently of excess demand for labor, i.e. independently of market forces. Wage settlements following recent outbursts of strike activity (e.g. May-June 1968 in France, the "hot-autumn" of 1969 in Italy, nation-wide strikes of coal miners in 1972 and 1974 in Great Britain) as well as the poor performance of conventional models in explaining the general wage inflation experienced by most western, industrial societies since the late 1960's appears to have enhanced the status of labor militancy, cost-push theories among orthodox economists. (1)

The main body of this paper examines various demand-pull and cost-push models of wage inflation against annual postwar data on

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(1) See, for example, Perry, 1975 and the discussion in parts II and III.

hourly compensation of manufacturing employees in four industrial societies: Italy, France, Great Britain, and the United States. (1) The principal aim of the paper is to show that the "power" and "militancy" of trade unions play an important role in the dynamic process of wage determination in a diverse group of industrial societies. Contrary to the usual practice, I summarize the main assumptions, arguments and conclusions of the paper here rather than at the end:

(i) The existence of a long-run unemployment-wage inflation trade-off (Phillips curve) requires (a) money illusion on the part of labor and/<u>or</u> (b) <u>trade union weakness</u> in wage bargaining.

(ii) I am persuaded on a priori grounds by the neoclassical-accelerationist position that widespread money illusion is implausible and argue that less than full wage adjustment to nontrivial episodes of price inflation is most likely due to the weakness of organized labor in collective bargaining.

(iii) The empirical results show that the long-run coefficient of adjustment of manufacturing wage changes to price changes is less than unity only in the United States, i.e. only in the U.S. is there any evidence of a non-vertical long-run Phillips-curve.

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(1) Throughout the paper I use "wages" and "compensation" interchangeably, although, they are of course distinct. All empirical results pertain to the latter.

(iv) The rate at which wages adjust to prices as well as the long-run magnitude of the adjustment coefficient are interpreted as a reflection of trade-union power in wage bargaining. Rank-ordering of the countries along these lines is consistent with the qualitative judgement of industrial relations specialists about the comparative 'power' of the various trade-union movements; particularly the comparative 'weakness' of organized labor in the United States.

(v) In all four countries trade-union militancy (which should be distinguished from trade-union power), as measured by strike activity, exerts sizeable effects on the rate of change of manufacturing wages independently of market forces. However, in most cases trade union action has not systematically contributed to accelerating wages and prices, except perhaps in recent years when "real wage resistance" has persisted in the face of changes in relative prices in favor of food and fuel producers.

(vi) Outside the United States (and other countries with relatively 'weak' trade-union movements) wage and price stability probably cannot be achieved without union acquiescence to some form of incomes policy -- unless, of course, political authorities are willing to run the economy at a <u>very</u> low (and politically infeasible) level of activity. The post-war experience suggests that barring major political changes such union cooperation is not likely to be forthcoming in any of the countries examined here with the partial exception of Great Britain; even there it has taken the conjunction of a Labour

Government facing an extraordinary economic crisis to elicit voluntary trade-union restraint.

I EXCESS DEMAND MODELS

Simple Phillips Curve

The point of reference for most contemporary treatments of wage inflation is A.W. Phillips' seminal study (1958) of the relation between unemployment and the rate of change of money wages in the United Kingdom over the period 1861-1957. Phillips employed somewhat unorthodox statistical procedures in his analysis, but his plots of the percentage rate of change of wages against the unemployment rate revealed a nonlinear, inverse association (convex toward the origin) which was replicated in many subsequent studies and is now widely known as the "Phillips curve." Phillips rationalized his empirical results with an excess demand argument that most work in this tradition has adopted:

> "When the demand for labour is high and there are very few unemployed we should expect employers to bid wage rates up quite rapidly, each firm and each industry being continually tempted to offer a little above the prevailing rates to attract the most suitable labour.... On the other hand it appears that workers are reluctant to offer their services at less than prevailing rates when demand for labour is low and unemployment is high so that wage rates fall only very

(1b) $w'(t) = b0 + b1\ 1/U(t) + b2\ \Delta U(t)$

where: w' = the percentage rate of change of wages (hourly compensation of employees in manufacturing) computed as 100 times the first backward difference of the natural logs;

U = the civilian unemployment rate;

ΔU = the first backward difference of U.

For purposes of comparison with the more realistic models introduced below, estimates of the simple Phillips curve model are reported in the first column of Tables 1a-1d. (The Tables appear at the end of the paper.) It will come as no surprise to those familiar with the contemporary wage determination literature that the simple excess demand, Phillips curve hypothesis does a poor job explaining the post war wage inflation. In all four countries the $\bar{R}^2$'s are low, the regression standard errors relatively high, and $\Delta U(t)$ has the wrong sign (positive). The level unemployment rate term, $1/U(t)$, is properly signed (positive) in all regressions but reaches conventional statistical significance only in the equation for Italy.

The most obvious empirical shortcoming of the 'naive' Phillips model is that no account is taken of movements in prices. Phillips did not ignore prices altogether; rather he advanced a threshold hypothesis in which price changes affected the wage bargain only when they threatened to reduce real wages, i.e. only when the rate of change of prices was greater than the rate of change of wages ($p' > w'$). Since in Phillips' sample real wages rarely fell over a sustained period, a price term was not explicitly incorporated into his wage equation.

Phillips Curve with Contemporaneous Price Changes

Among the first to build price changes directly into the wage equation was Lipsey (1960). However, Lipsey's most important contribution was his attempt to tie the inflation-unemployment (Phillips curve) trade-off to conventional supply and demand economic analysis. Without reproducing the details here, Lipsey developed an argument showing that

(i) the proportional rate of change of money wages is a linear function of the ratio of excess demand to total labor supply, and

(ii) the unobserved excess demand ratio is approximated by a negatively sloped, nonlinear function of the observed unemployment rate, U.

Lipsey's disequilibrium wage adjustment model was generally taken to be a strong theoretical rationalization of the empirical Phillips curve. (1) Lipsey also developed an ingenious explanation -- which centered on the consequences of aggregating individual market trade-off curves across markets -- for the aggregate association observed by Phillips between the rate of

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(1) Objections on theoretical grounds were, of course, raised. See, for example, Corry and Laidler, 1967. The accelerationist argument is treated in the next section.

change of wages and the rate of change of unemployment, U'. (1)

The empirical form of Lipsey's model is simply the naive Phillips curve equation with a term for contemporaneous price changes.

2) $w'(t) = b0 + b1\ 1/U(t) + b2\ p'(t) + b3\ U'(t)$

where: p' = the percentage rate of change of prices (computed by the difference-log method described previously) and all other terms are as defined earlier.

Since the Phillips curve argument does not depend heavily on U'(t) and this term was insignificant in all regressions (studies using this class of models typically find b3 = 0), the results reported in the second column of Tables 1a-1d are based on equations omitting the rate of change of unemployment term. The estimates for this model yield little evidence in favor of the conventional Phillips curve argument. The coefficient of the unemployment or excess demand term 1/U(t) has a perverse (i.e. wrong) sign in the equations for France and Great Britain, and is insignificant in the regression for Italy. Moreover, the coefficient of the contemporaneous price change term p'(t) is not significantly different from unity in the regressions for France and Great Britain and is significantly greater than unity in the

(1) Lipsey used the proportional rate of change of the unemployment rate (U') in his study rather than the simple rate of change (ΔU) used in equation 1. Phillips appears to have had the latter in mind, but I found that it made little difference: regressions using U'(t) produced results very similar to those reported in column 1 of the Tables.

equation for Italy. (1) This result alone is sufficient to deny the Phillips curve thesis for it implies that the wage bargain is struck in real rather than money terms and, therefore, there cannot be a trade-off between the nominal phenomenon of money wage inflation and a real quantity such as the unemployment rate. (2) This point is pursued further in the next section. Only for the United States do the estimates for equation (2) support the (wage) inflation-unemployment trade-off view. The results in column 2 of Table 1d show a significant positive parameter estimate for 1/U(t) and an estimate for p'(t) (0.58) that is many standard errors less than unity.

Price Expectations Phillips Curves

The Phillips-Lipsey trade-off model implies that high rates of inflation yield long-term benefits in the form of lower unemployment. This view is plausible on theoretical grounds only if one of the following conditions is satisfied:

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(1) A similar estimate of the elasticity of manufacturing wages with respect to prices for postwar Italian data is reported by Sylos-Labini (1974), who surprisingly does not comment on its implications. As it turns out (see the following sections), the long-run elasticity is on the order of 1.0.

(2) I am inclined to pay greater attention to the coefficient of p' than U in evaluating the Phillips curve thesis since it can be argued with some justification that during the postwar period unemployment and other measures of aggregate demand have not varied enough to permit a sharp estimate of the excess demand coefficient. For all of the countries treated in this study the coefficient of variation ($s_x/\bar{X}$) of p' is substantially greater than that of U.

1) Workers value, at least to some extent, nominal wage increases alone; i.e. a significant fraction of the labor force suffers from 'money illusion.' And/or

2) Other things being equal, labor organizations are not powerful enough vis-a-vis management to obtain full wage adjustment to price increases.

Among economists, the trade-off debate has hinged largely on the plausibility of the first condition. For example, Tobin (1968) summarizes the theoretical foundation of the Phillips curve this way:

> "The Phillips curve idea is in a sense a reincarnation of the original Keynesian idea of 'money illusion' in the supply of labor. The Phillips curve says that increases in money wages -- and more generally, other money incomes -- are in some significant degree prized for themselves, even if they do not result in equivalent gains in real income." (1)

Economists working in the strict neoclassical tradition attack this idea pointing out that even though wages are set in money terms, the wage determination process is essentially a

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(1) In The General Theory (1936) Keynes wrote "The workers... resist reductions of money wages... whereas they do not resist reductions of real wages.... Every trade union will put up some resistance to a cut in money-wages, however small. But since no trade union would dream of striking on every occasion of a rise in the cost of living, they do not raise the obstacle to any increase in aggregate employment which is attributed to them by the classical school." (pp. 14-15.)

bargain for real wages conditioned by the forecasts of buyers' and sellers' of labor of the behavior of prices over the contract period. Hence Friedman (1968), Phelps (1967, 1968) and others argued, persuasively in my view, that any steady rate of inflation will eventually be anticipated fully by economic actors and that wage adjustment to expected price inflation will be complete, i.e. the long-run elasticity of wages with respect to prices will be unity. In this view the Phillips curve is merely a short-run, "statistical" phenomenon stemming from lags in adjustment between expected and actual rates of price (and/or wage) inflation. In Friedman's words:

> "There is always a temporary trade-off between inflation and unemployment; there is no permanent trade-off. The temporary trade-off comes not from inflation *per se*, but from unanticipated inflation, which generally means a rising rate of inflation. The widespread belief that there is a permanent trade-off is a sophisticated version of the confusion between "high" and "rising" that we all recognize in simpler forms. A rising rate of inflation may reduce unemployment, a high rate will not." (1968, p. 11)

The position of neoclassical, 'expectations' theorists is, then, that the wage equation should be specified in the form:

(3a) $w'(t) = b0 + b1\ 1/U(t) + b2\ p^{*\prime}(t)$

where: $p^{*\prime}$ = the expected rate of price inflation.

b2 can be interpreted as the parameter of money illusion. If b2 = 0, equation (3a) reduces to the simple Phillips curve model introduced earlier. For $0 < b2 < 1$ we have what essentially is the Phillips-Lipsey model of the last section in which the long-run trade-off between (wage or price) inflation and unemployment is steeper (less favorable) than the short-run Phillips curve. Friedman, Phelps and other strict expectations theorists assert that b2 = 1. There is no money illusion in the labor market, and the long-run Phillips curve is a vertical line crossing the U axis at the "natural rate" of unemployment. The only possible long-run trade-off is therefore between the rate of change of <u>real</u> wages (w' - p') and the unemployment rate and/or between the rate of <u>acceleration</u> of inflation and the unemployment rate. (1)

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(1) Evaluating (3a) at steady state, (i.e. at p' = p*'), b2 = 1 implies

$$(w' - p') = f(U).$$

Any trade-off is therefore between changes in real wages and unemployment (excess-demand).

Passing a price function through (3a) illustrates the acceleration argument. Suppose p' follows the simple markup scheme

$$p' = w' - x'$$

where x' = rate of change of labor productivity, and it is implicitly assumed that any asymmetry in the system (which is necessary for the existence of a conventional trade-off) occurs in the wage equation. Hence, we have

$$p' = (b0 - x') + b1\ 1/U + b2\ p^{*\prime}$$

which for b2 = 1 implies

$$\frac{d\ p'}{dt} = \frac{1}{p}\ \frac{d^2 p}{dt^2} = f(U).$$

The trade-off is therefore between the rate of acceleration of

Since price expectations are not measured directly, empirical testing of (3a) requires that $p^{*\prime}$ be specified in terms of observable variables. The conventional practice is to use some function of actual price changes p'. For annual data the hypothesis

$$(3b) \quad p^{*\prime}(t) = p'(t)$$

is not unreasonable. Expectations may be fully embodied in actual price changes averaged over a twelve month period. This hypothesis was effectively tested by the estimation of equation 2. The results (in the second column of Tables 1a-1d) provided strong support for the neoclassical or strict expectations argument. The hypothesis b2 = 1 was rejected only for the United States.

A second model for price expectations is the unconstrained, finite autoregressive scheme

$$(3c) \quad p^{*\prime}(t) = \sum_{i=0}^{r} a(i)\ p'(t-i)$$

in which expectations are generated by the weighted, finite sum of current and lagged price changes.

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inflation and the employment rate, and requires that workers be continually 'surprised' by new bursts of inflation ($p' > p^{*\prime}$).

The "natural rate" of unemployment is given by the root of the equation

$$p' - p^{*\prime} = 0 = (b0 - x') + b1\ 1/U$$

$$= -b1/(b0-x').$$

The third model tried in this study incorporates the adaptive expectations hypothesis

$$(3d)\quad p^{*\prime}(t) - p^{*\prime}(t-1) = (1-a)\ (\ p'(t) - p^{*\prime}(t-1)\ )$$

$$p^{*\prime}(t) = (1-a) \sum_{i=0}^{\infty} a^{i}\ p'(t-i)$$

$$p^{*\prime}(t) = (1-a)/(1-aL)\ p'(t)$$

where: L is a lag operator.

In the adaptive model, price expectations are revised linearly each period in proportion to some fraction of last period's forecast error. The model implies that expections are governed by an exponentially weighted moving average of observed price changes.

Estimation of the price expectations Phillips curve models using the finite autoregressive and the adaptive schemes for $p^{*\prime}$ rendered essentially the same results and so estimates of only the former scheme are reported in the third column of Tables 1a-1d. (1) The results for France, Great Britain and the United States do not differ appreciably from the estimates of the Phillips-Lipsey model shown in column 2. The unemployment term

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(1) The adaptive price expectations version was tested by estimating the implied nonlinear equation

$$w'(t) = b0(1-a) + a\ w'(t-1) + b1\ 1/U(t)$$
$$-b1\ a\ 1/U(t-1) + b2(1-a)\ p'(t).$$

The estimate of b2 was approximately unity in the regressions for Italy France, and Great Britain. I experimented with lags of various lengths in the finite autoregressive expectations models; the tables report the best fitting equation.

again has the 'wrong' sign in the regressions for France and Great Britain and, more important, the sum of the price change coefficients is just about unity. However, in the case of Great Britain the sum of the autoregressive price coefficients (1.2) exceeds the contemporaneous price coefficient of equation 2 (0.843) by a large enough margin to yield an increase in $\overline{R}^2$ and a decrease in standard error of the regression. The price expectations model estimates for the United States are essentially the same as those of the static Phillips-Lipsey equation: the parameter of the inverse of the unemployment rate is positive and significant, and the elasticity of wages with respect to prices is on the order of 0.6. (1)

The estimate of the sum of the price change coefficients for Italy represents the most important departure from previous results. The coefficient of contemporaneous price changes p'(t) in equation 2 was 1.65, i.e. was substantially larger than unity. This, of course, implies that every burst of price inflation is followed by a sizeable increase in real wages -- an implausible result. (2) The sum of the coefficients of the p'(t-i) in column

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(1) I ran a number of additional experiments for the U.S. testing the idea (which appears from time-to-time in the literature) that the coefficient of adjustment is closer to unity once a critical threshold in observed rates of price inflation is reached. I could find little support for this appealing hypothesis. Since I do not find the "rational" expectations argument plausible on theoretical grounds, experiemnts along these lines were not tried.

(2) Adding the rate of change of labor productivity to the contemporaneous price change model for Italy does not appreciably alter this result: the parameter estimate of p'(t) is 1.6 and the productivity term is insignificant. Adding productivity to

3, Table 1a shows that the long-run elasticity of wages with respect to prices in Italy is not significantly different from 1.0. The time path of the price coefficients -- substantially greater than unity at time (t), negative at times (t-1) and (t-2) -- does indicate, however, that in the Italian system prices are more or less continually chasing wages. (1) Clearly there is little evidence of neoKeynesian money illusion. (2)

Why is the United States the only country of the four industrial societies considered in this study to exhibit a viable Phillips curve? (3) I doubt it is because workers and/or union leaders in the United States, unlike their Italian, French, and British counterparts, suffer from money illusion. In other words I think it is unlikely, particularly in the manufacturing sector, that a sizeable fraction of the labor force in any industrial society is fooled by (or prizes to a significant degree) money

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the equations for the other countries did not yield anything worth reporting either.

(1) The period-by-period price coefficients are: $p'(t) = 1.89$, $p'(t-1) = -0.18$, and $p'(t-2) = -0.48$.

(2) As in other studies of wage inflation there is some danger that the price coefficients reported here suffer from (simultaneous equations) bias. It is unlikely that this accounts for the pattern of results but the only way to sort the matter out definitively would be to employ a correctly specified 'large' econometric model in which wages, prices, as well as employment were jointly endogenous. I take heart in the fact that according to Ezio Tarantelli, economist at the University of Florence and consultant to the Bank of Rome, prices also 'chase wages' in the Bank's econometric model of Italy.

(3) I do not mean to imply that the U.S. Phillips curve has been stable over the postwar period -- there is a great deal of evidence that it has not. See, for example, the comparative analysis of Gordon, 1972.

wage increases alone. A more plausible model would specify that the elasticity of target wages with respect to expected prices is unity, or very nearly so, at least in industrial labor markets. If this idea has merit, then international variation in the rate and equilibrium magnitude of the adjustment of observed wages to price inflation reflects to some extent differences in the power of trade unions to obtain target wage increases rather than money illusion in labor markets. (1)

Recall that the pattern of results for the elasticity of wages with respect to prices across the four countries was:

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(1) I am not saying that if trade unions did not exist the elasticity of wages with respect of prices would be zero. This is an absurd argument. Trade union power presumably makes a difference on the margin; but the margin may be important enough to determine whether there is a viable Phillips curve trade-off. If equations in the form of 3 were estimated for a large number of countries (or sectors or industries -- see the note on the following page), then analyses of the following sort in principle could be undertaken.

$a(i) = A + g(Xki)$

where: $a(i)$ = the long-run elasticity of observed wages with respect to prices in the ith country (sector or industry)

A = pure "market" component

$g(Xki)$ = union"power" component

Xki = a vector of variables measuring the (relative) wage bargaining power of trade unions.

A similar model might be specified for the rate of wage adjustment, which might exhibit greater international (intersectoral, interindustry) variation. Obviously the job of identifying and measuring Xki and specifying g would not be trivial. Until serious studies along these lines are undertaken, the argument in the text will remain in large part speculative.

Italy	full wage adjustment to price inflation in the long-run; 'prices chasing wages' in the short run
Great Britain and France	full and more or less instantaneous (annual) wage adjustment to price inflation
United States:	less than full long-run wage adjustment; viable Phillips curve.

If one adopts the hypothesis that wage adjustment dynamics in part reflect the power of organized labor in collective bargaining, these results imply that (in the manufacturing sector at least) trade unions are most powerful in Italy, strong in Great Britain and France, and comparatively weak in the United States. (1) Without attempting to discuss or reference the voluminous literature here, I think it is accurate to say that this rough rank ordering is consistent with the qualitative assessment of most industrial relations specialists about the comparative strength in wage bargaining of organized labor in

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(1) My interpretation of these results is compatible with intranational, cross-sectional studies finding that the elasticity of wages with respect to prices is higher in strongly unionized industries than in weakly organized sectors. See Pierson, 1968 (United States); Vanderkamp, 1966 (Canada); and Thomas, 1974 (Great Britain).

these countries. (1)

Perhaps the best way to illustrate international differences in trade union power is to contrast briefly the situation in the two polar cases -- Italy and the United States. In Italy it is extremely difficult for employers, even if hard pressed, to dismiss workers. Moreover, the wages of most workers (nearly all in the manufacturing sector) are pegged to the cost of living, and escalator wage adjustment (scala mobile) takes place every three months. More dramatic examples of institutionalized trade union power are difficult to find. By comparison, in the United States there are virtually no constraints on employers' rights to discharge workers for economic reasons, and only the strongest and most innovative unions have tried (with very limited success) to bargain for cost of living wage escalator clauses. Wage adjustment takes place almost wholly via periodic contract renegotiation. It is hardly surprising, therefore, that the response of wages to price inflation in the United States is both less rapid and less complete than in Italy.

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(1) Note that in Italy and France, where the state is an important actor in the (private as well as public sector) labor market, i.e. is involved in setting wages, hours, and conditions of work, trade union power to a great extent means the ability to induce concessions from the government.

II 'SOCIOLOGICAL', COST-PUSH MODELS

It was noted in the introductory section that the excess demand class of wage inflation models are easily rationalized from a cost-push or collective bargaining theoretical perspective. (1) The empirical results presented in part I were to some extent interpreted from this point of view. The purpose of this section is to determine whether explicit indicators of union 'pushfulness' or labor militancy have significant influence on the rate of change of wages independently of price movements and unemployment. In other words we hope to learn whether autonomous trade union actions exert significant upward pressure on money wages, or whether discrete expressions of union militancy merely represent a form of ritualized conflict ratifying outcomes that market forces would have produced in any case. A variety of direct and proxy measures have appeared in the 'sociological' cost-push literature; the principal ones are:

(i) the level and rate of change of profits

(ii) the rate of change of the proportion of the labor force in trade unions

(iii) subjective (ad hoc) estimates of labor militancy

(iv) strike activity.

The relevant models and empirical results are presented below.

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(1) A more sustained argument along these lines is given by Rees, 1970.

Profit-Augmented Wage Change Models

Among the first to challenge Phillips-type excess demand models of wage inflation and to propose an alternative collective bargaining theory in which profits played a central role was Kaldor (1959). Kaldor argued that "the rise in money wages depends on the bargaining strength of labor; and bargaining strength, in turn, is closely related to the prosperity of industry, which determines both the eagerness of labour to demand higher wages and the willingness and ability of employers to grant them." (p. 293, emphasis in the orginal). By prosperity Kaldor clearly meant the rate of change of profits: "The rise in wages is prompted by the rise in profits." (p. 294)

Kaldor's rather casually formulated theory was followed by a series of empirical studies testing the impact of profits and the rate of change of profits on the rate of wage inflation. (1) These studies produced rather mixed results and hence the thesis that movements in profits are an important influence on wage changes remains problematic.

Comparative results for a profits augmented manufacturing wage inflation model are reported in the fourth column of Tables 1a-1d and are based on the equation:

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(1) Bowen, 1960; Lipsey and Steuer, 1961; Bhatia, 1961; Perry, 1964 and Bodkin, 1966. There is no unique measure of the level of profits. Profits as a percentage of stockholders' equity, the ratio of profits to wage income, and the ratio of profits to total income produced are all acceptable indicators. The various measures generally point in the same direction.

$$(4)\quad w'(t) = b0 + b1\ 1/U(t) + \sum_i a(i)\ p'(t-i)$$

$$+ b2\ \underset{(R/W)}{R/Y(t)} + b3\ \underset{(\ \ R/W)}{\Delta R/Y(t)}$$

where: R/Y = manufacturing profits as a percentage gross income produced (Italy, Great Britain);

R/W = manufacturing profits as a percentage of employee compensation (U.S.);

and all other terms are as previously defined.

The regression estimates give little or no support to the profits thesis. (1) The profit level term R/Y is significant but has the wrong sign (negative) in the equation for Italy; elsewhere the level of profits and the rate of change of profits variables have negligible, perversely signed coefficients and very small t-statistics. (2)

Contrary to Kaldor's argument these results indicate that in the presence of unemployment and (especially) price inflation variables, the profits terms have no systematic influence on the rate of wage inflation. Either union bargaining strength and militancy have no appreciable effect on wage movements or profits variables are poor proxies for these concepts. Evidence presented ahead suggests the latter is true.

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(1) I was unable to find manufacturing profits data for France and so no results are reported in colum 4, Table 1b.

(2) Models in which the profits terms were lagged performed no better. Notice also the large, implausible constants in the equations for Italy and Great Britain.

Wage Inflation and Trade Union Mobilization

Perhaps the most forceful and influential argument that trade unions affect the rate of change of wages independently of the demand for labor was made in a series of papers by A.G. Hines (1964, 1968, 1969). In his celebrated 1964 article in the Review of Economic Studies on wage inflation in the United Kingdom over the 1893-1961 period, Hines showed that one measure of union 'pushfulness' -- the rate of change of the percentage of the labor force unionized -- accounted for a sizeable fraction of the variation in the rate of change of wages. Indeed, in the inter-war and early post-war years, it appeared to be the most important explanatory variable. (1) Hines rationalized the use of changes in the density of unionization as a proxy for labor pushfulness with the assumption that militancy is simultaneously manifested in union recruiting drives and pressure on wage rates: "a successful membership drive (is) a necessary accompaniment of success in the wage bargain." (1969, pp. 67-68)

Hines' thesis implies a model of the form

$$(5) \quad w'(t) = b0 + b1\ 1/U(t) + \sum_i a(i)\ p'(t-i) + b2\ \Delta T/L(t)$$

where: T/L = trade union membership (T) as a percentage of the labor force (L).

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(1) Hines' last post-war observation was 1961. The importance of this will become clear below. Similar results were reported by Ashenfelter et al. (1972) in their study of manufacturing wage changes in the United States during the period 1914-1963.

Since union membership data for France and Italy are very unreliable and, more important, the meaning of unionization in these countries is not comparable to that in other western labor movements, (1) equation 5 was estimated only for Great Britain and the United States. The results appear in column 5 of Tables 1c and 1d.

The regression estimates yield only weak support for the trade union mobilization hypothesis: the coefficient of $\Delta T/L$ is properly signed in both regressions but is insignificant in the equation for Great Britain and only marginally significant in the U.S. model.

Why do these estimates contrast so sharply with the impressive results of the Hines and Ashenfelter et al. studies? The reason undoubtedly is that by the mid- or late- 1950's union mobilization is more or less complete and the small observed fluctuations in the density of union membership no longer serve as a very good proxy for variations in labor militancy in wage bargaining. Models incorporating what I think are more direct indicators of labor militancy are introduced in the next section.

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(1) In Great Britain, the United States and most other western systems union 'members' include all workers covered by contract who merely pay dues, typically via an automatic check-off (payroll deduction) method. In contrast, 'members' of the largest (communist) unions in France and Italy are usually militant activists. (Although in recent years the French CGT and the Italian CGIL have tried to become mass organizations.) The strength of French and Italian unions are probably judged better by the number of workers they can mobilize for an activity rather than by the number of their official members.

Strike Activity and Wage Inflation

Dramatic outbursts of strike activity since the late 1960's in Italy, France, Great Britain and several other countries led to renewed attempts to incorporate labor aggressiveness explicitly into models of wage inflation. The most recent effort is Perry's comparative study done for the 1975, 2 issue of the Brookings Papers on Economic Activity. Perry called attention to the increased militancy over wage issues in the late 1960's and early 1970's, formulated a "battle over income shares" interpretation of labor unrest, and on the argument that the shares hypothesis could not be captured by a continuous variable introduced dummy variables for the years of wage explosions in the equations for the seven countries in his sample. Although the "shares" dummy variables generally increased the fits and enhanced the forecasting performance of his wage models, Perry's approach is purely ad hoc and therefore is of limited scientific value. (1)

A much more straightforward measure of trade union militancy or pushfulness in wage bargaining is strike activity. A number of earlier papers incorporated strike indicators into wage

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(1) Predictably, the arbitrary charcter of Perry's test of the militancy-shares hypothesis was pointed out during the discussion of the paper. See the comments by Ackley and Nordhaus, BPEA, 1975, 2. For an earlier attempt to build subjective estimates of trade union militancy into wage inflation models, see Dicks-Mireaux and Dow, 1959.

determination models and the results typically supported the militancy hypothesis. (1) The principal exception, and an important one, is the comparative study by Ward and Zis (1974). They concluded from their analysis of postwar wage inflation in six countries that "the evidence...does not seem to support strongly the cost-push [strike] hypothesis...." (p. 55). Actually, Ward and Zis' conclusion is somewhat misleading: their regressions showed one or more strike indicators to be significant variables in three of the six countries. Morover, The Ward and Zis study suffers from at least three important limitations:

(i) an explicit scheme for strike measurement is never introduced and heavy reliance is placed upon the arbitrary index developed by Galombos and Evans (1966); (2)

(ii) data on the strike indicators pertain to economy-wide aggregates whereas the wage data are for the manufacturing sector; (3)

(iii) Only contemporaneous strike activity appears in the wage equations, yet strike induced wage increases are often not fully observed until a year or more has elapsed.

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(1) See Ashenfeter et al., 1972 (United States), Knight, 1972 (Great Britain), Sylos-Labini, 1974 (Italy), Taylor in Parkin and Sumner, eds., 1972 (Great Britain), Taylor, 1974 (Great Britain, United States), and Swidinsky, 1972 (Canada). An extended qualitative discussion of British case is provided by Jackson, et al., 1972.

(2) See Knowles, 1966 for a thorough critique of the Galombos and Evans indices.

(3) This is also true of other studies of strikes and wage inflation. Cf. the sources citied in the earlier note.

The first objection raised above suggests that it is important to develop a conceptual scheme for strike measurement before undertaking empirical analysis. The International Labor Office complies and publishes data on three basic components of industrial conflict that are supplied by the national labor ministries: the number of strikes, the number of workers involved (strikers), and the number of man-days lost in strike activity. Annual data on these components are reported for economy-wide totals and for nine separate sectors of economic activity. In this paper we are interested only in manufacturing strike activity.

Following the earlier, seminal work of Forcheimer, Knowles, and Goetz-Girey and the more recent work of Shorter and Tilly, (1) the basic industrial conflict variables are used in conjunction with data on manufacturing wage and salary employment to form three theoretically distinct dimensions of strike activity: the average size of strikes, i.e. the number of workers involved per strike; the average duration of strikes, i.e. man-days lost per worker involved; and a labor force-adjusted measure of strike frequency, i.e. the number of strikes per number of manufacturing employees.

Size: workers involved (strikers)/strikes

(1) Forcheimer, 1948; Knowles, 1952; Goetz-Girey, 1963; and Shorter and Tilly, 1971.

Duration: man-days lost/strikers (1)

Frequency: strikes/civilian wage and salary workers.

It is advantageous, to array these variables into a three-dimensional solid or cube depicting the typical profile or "shape" of strike activity in a particular nation during a particular time period. Figure 1 displays two distinctive, hypothetical strike shapes. Perhaps the most suitable index of overall strike activity is a quantity akin to the physical concept of volume, which of course is simply the product of the three dimensions depicted in Figure 1:

Strike Volume =	Frequency	X	Duration	X	Size
man-days lost per number of employees	strikes / employees	X	man-days / workers involved	X	workers involved / strikes

(1) Notice that strike duration is calculated from the available aggregate data by dividing total man-days lost by the total number of strikers, which yields a "weighted" average duration (as opposed to a simple arithmetical average computed from individual disputes) -- the weights being proportionate to the number of workers involved in the strike. For example, if w_1, w_2 ... w_n are the number of workers involved in strikes 1,2...n, and if d_1, d_2, ... d_n are the corresponding durations of these strikes (in days), the number of man-days lost m_1 m_2 ... m_n = d_1w_1, d_2w_2, ... d_nw_n. The Total number of man- days lost is $M = m_1 + m_2 + \ldots + m_n$, and the total number of workers involved is $W = w_1 + w_2 + \ldots + w_n$. The weighted average duration defined in the text is therefore

$$\text{Duration} = \frac{M}{W} = \frac{m_1+m_2+\ldots m_n}{w_1+w_2+\ldots+w_n} = \frac{d_1w_1+d_2w_2+\ldots+d_nw_n}{w_1+w_2+\ldots+w_n},$$

where the weights are the number of workers involved in each dispute. The practical significance of this is that the duration measure is heavily influenced by large-scale strikes.

Man-days lost from strikes per number of employees has both theoretical justification (being the volume of a three-dimensional profile that characterizes strike activity at any time or place) and obvious intuitive appeal as a

Figure 1 About Here

comprehensive index of industrial conflict.

Cost-push models incorporating the strike dimension variables as the indicators of labor militancy in wage bargaining were estimated in the following general form:

$$(6)\quad w'(t) = b0 + b1\ 1/U(t) + \sum_{i} a(i)\ p'(t-i) + \sum_{ji} c(ji)\ S(jt-i)$$

where: Sj = manufacturing sector strike dimension variables.

Regression experiments based on equation 6 were tried for various combinations of strike variables and time lags. On a priori grounds I expected strike volume (mandays lost per number of manufacturing employees) and strike frequency (the number of strikes per number of manufacturing employees) to have the biggest effects on movements in wages -- strike volume because it is the most comprehensive indicator of labor militancy and strike frequency because it represents the number of aggressive labor actions of whatever duration and size. (1) Strike size depends

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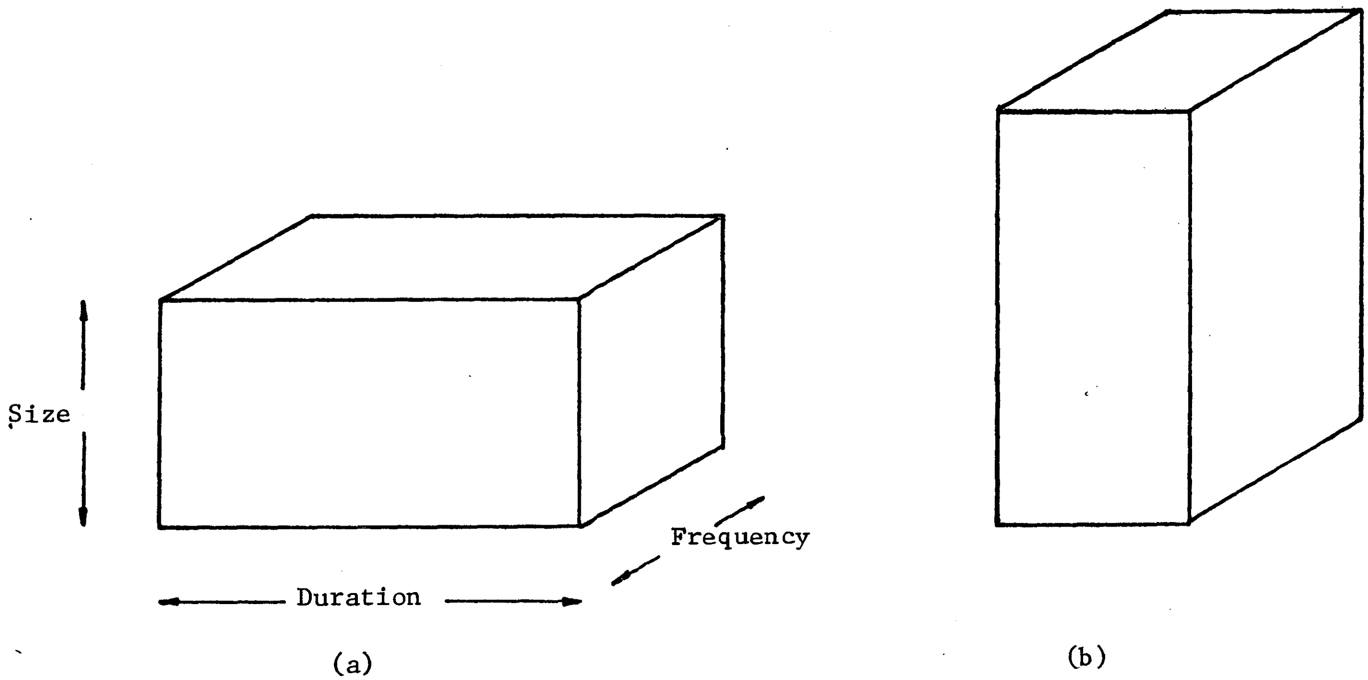
(1) The occurence of a strike of course depends to a certain

Figure 1: Hypothetical Strike Profiles



largely on the scale of firms or, more important, the scale of the bargaining unit and therefore it was not anticipated to exhibit any systematic influence on wage inflation. Increases in strike duration beyond a certain (and probably rather low) threshold are unlikely to influence the wage settlement substantially and I think in most cases reflects the stuborness of the parties in accepting the inevitable outcome. So I did not expect duration to be a very strong predictor of wage charges either.

Although the logic of these a priori hunches may be faulty, they were strongly supported by the empirical results: the coefficient estimates in column 6a, Tables 1a-1d show that in each of the four countries strike volume or strike frequency or both had sizeable and significant effects on the rate of wage inflation. In every case the strike equations yield a substantially higher corrected multiple correlation and a lower standard error of the regression than the rival models discussed earlier. With the exception of the strike frequency variable in the regression for France, a one year lag on the strike terms produced the best fits. (1) Official statistics on French strike activity in 1968 have never been published and therfore the model for France includes a dummy (binary) variable to pick up the

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extent on the behavior of both labor and management (and/or government) but the vast majority of strikes are labor initiated.

(1) Frequency data for the manufacturing sector were not available for France and therefore the economy-wide frequency is used as a proxy.

effects of the great May-June 1968 general strike. The coefficient of the dummy variable implies that the 1968 strike wave produced an increase in manufacturing hourly wages between 7 and 8 percent greater than what would have otherwise been expected. (1)

The excess demand term 1/U remained insignificant in the equations for Italy and France, and dropped to insignificance in the U.S. regression. (2) Hence the inverse of the unemployment rate variable was deleted from the equations for these countries. (Estimates for the revised wage models are reported in columns 6b-6c of the tables.) In the strikes model for Great Britain, however, the 1/U term (for the first time) achieves significance. That is, net of strike volume and strike frequency, the level of excess demand for labor appears to exert significant influence on the rate of wage inflation. It has been suggested (see, for example, Feldstein, 1973) that the breakdown of the unemployment-wage inflation connection in Great Britain, which was first noticed in the late 1960's, was due in part to upward adjustments in unemployment compensation initiated by the Labour Government in the latter part of 1966. However, the results for

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(1) This estimate appears to be right on target. The agreement which ended the 1968 workers' strike, the Protocole de Grenelle, provided for wage increases of 4.5 to 5 percent on June 1, and another 2.5 to 3 percent on October 1.

(2) Since large fractions of the Italian and French labor forces were until recent years employed in agriculture, a nonagricultural unemployment rate variable was also tried in the equations for these countries. This alternative measure of the demand for labor did not yield significantly different results, however.

model 6b in Table 1c show that the location and slope of 1/U(t) are stable over the post- 1967 period. The reason for the revival of the 1/U(t) term is, I believe, that the usual inverse association between unemployment and labor militancy (1) broke down in Great Britain in the mid-1960's (perhaps because of the change in unemployment compensation emphasized by Feldstein and others). Thus Great Britain experienced steadily increasing strike activity in the face of rising measured unemployment. Only after the effects of strike activity are netted out, therefore, does the excess demand-wage inflation linkage in Great Britain show up in the regressions. (2) This implies that the tightness of labor markets (level of aggregate demand) has contributed to the postwar British inflation.

The coefficients of the rate of change of prices are generally smaller in the strike equations than in the expectations models discussed earlier. These results are not surprising in view of the sizeable correlations among the strike and price variables. (More on this in a moment.) What they suggest is that the more or less complete adjustment of wages to prices observed in the pure expectations models for France and Great Britain, as well as the partial adjustment estimated for the United States, depend importantly on labor militancy as well

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(1) On this point see Hibbs, 1976a and the sources cited therein.

(2) The correlation between measured unemployment and strike activity is strongly positive during the latter postwar years in Great Britain. The conclusion in the text is readily demonstrated using standard specification error algebra.

as trade-union "power." In other words, trade-union strike action is an essential mechanism for the adjustment of wages to prices in these countries.

In contrast, the results of the strike equations for Italy show that the sum of the price coefficients is still essentially unity -- indeed as I noted earlier prices typically are chasing wages. (1) This implies that full wage adjustment in Italy does not hinge directly on the incidence of strike activity, which squares with our earlier observations about the power of Italian trade-unions.

Since strike activity is known to be influenced by current and lagged values of unemployment and prices, (2) perhaps the strike terms in Equation 6 merely register the effects of these omitted economic variables. Quasi-reduced form regressions including appropriately lagged umemployment and price inflation terms were therefore estimated to guard against this possibility. (3) The results appear in column 7, Tables 1a-1d. Although the t-statistics of the strike variables are generally smaller in these regressions, it is clear that the strike activity

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(1) That is, the p'(t) coefficient is substantially greater than 1.0 and the p'(t-2) coefficient is sizeable and negative.

(2) See the evidence and references in Hibbs, 1976a.

(3) Prior work indicates that the untransformed unemployment rate, U, is the best predictor of strike activity and so this variable is used in the regressions. The time index on U corresponds to the index and the index lagged one period of the strike variable(s). For example, if the strike variable appears in the original equation at time (t-1), U(t-1) and U(t-2) enter the quasi-reduced form regression. The price inflation variables are specified at time (t), (t-1), and (t-2).

coefficients are very robust in the face of a rather severe test. (1) It seems very unlikely, then, that the estimated influence of labor militancy on wage inflation merely reflects the effects of present or past states of aggregate economic activity.

Just how important are the labor militancy terms <u>relative</u> to the macroeconomic variables in explaining wage inflation? There are several ways to approach this question. One method is to look at the 'beta' or standardized regression coefficients. (The square of these coefficients gives the proportion of the variance of the rate of change of wages that can be <u>uniquely</u> attributed to a particular variable.) Beta coefficients for each term in the best strike-augmented wage equation are reported in Table 2. (2) Although the beta coefficients of the strike terms are somewhat smaller than those of the macroeconomic variables, they are sizeable and show that a nontrivial proportion of the variation in wage inflation is due to fluctuations in strike activity. However, this much was already fairly clear from earlier results -- the strike wage equations exhibited substantially higher $\bar{R}^2$'s than alternative models.

Perhaps a better way of assessing the relative importance of labor militancy is to compute the products of ordinary regression

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(1) Since strike activity responds to prior movements in real wages rather than money wages (see the study cited in Hibbs 1976a above), quasi-reduced form regressions in which real wage change terms replaced the price terms were also estimated. Again, the strike activity coefficients were robust.

(2) The "best" strike models from Table 1 are 6b for Italy, 6c for France, 6a for Great Britain, and 6c for the United States.

coefficients times the means of the associated variables over time intervals of interest. The second and third rows of Table 2 show the resulting effect estimates, i.e. the average impact of unemployment, prices, and strike activity on the rate of wage inflation, for two periods: 1955-64 and 1965-74.

Again, it is obvious from the $b_i\bar{X}_i$ quantities

Table 2 About Here

that the strike variables have contributed importantly to the rate of increase of manufacturing wages during the postwar period. Contrary to what I had expected, though, there is no general sign that the strike terms have had greater relative effects on the upward movement of wages during the recent period (1965-74) than during the earlier era (1955-64). However, the relative effects of the strike activity variables do exhibit a cross-national pattern that reinforces previous remarks concerning the role of labor militancy versus trade-union power in the wage inflation process. The pattern is best revealed by taking the ratio of the strike activity average wage inflation effects to the average impact attributed to the macroeconomic terms, i.e. by calculating

$b_i\bar{X}_i$ (strikes)/$b_i\bar{X}_i$ (macroeconomy).

Table 3 gives the results, which are based on the data on Table 2. The average impact ratios indicate that in both subperiods strike activity was more important than the macroeconomic variables in explaining wage inflation in the

Table 2 Relative Importance of Unemployment, Prices, and Strike Activity in Structural Models of Wage Inflation (based on results of equations 6-6c)

	F(t)	F(t-1)	V(t-1)	1/U(t)	p'(t)	p'(t-1)	p'(t-2)
Italy							
beta coefficient			0.411		0.576	0.152	-0.302
$b_i\overline{X}_i$ (1955-64)			1.38		4.91	1.23	-2.12
$b_i\overline{X}_i$ (1965-74)			3.27		7.87	1.77	-3.54
France*							
beta coefficient	0.375		0.319		0.644		
$b_i\overline{X}_i$ (1955-64)	4.51		0.900		3.09		
$b_i\overline{X}_i$ (1965-74)	5.03		1.03		3.69		
Great Britain							
beta coefficient		0.529	0.392	0.460	0.578		
$b_i\overline{X}_i$ (1955-64)		1.28	1.27	4.48	2.04		
$b_i\overline{X}_i$ (1965-74)		3.80	2.18	2.98	4.55		
United States							
beta coefficient		0.406			0.591		
$b_i\overline{X}_i$ (1955-64)		3.45			0.716		
$b_i\overline{X}_i$ (1965-74)		3.71			2.30		

*excludes contribution of 1968 strike wave

key:

F = strike frequency

V = strike volume

p' = percentage rate of change of prices

U = unemployment rate

$b_i\overline{X}_i$ = regression coefficient x mean

United States and

Table 3 About Here

less important in Italy. France and Great Britain fall between these polar cases, although, the French ratio implies that, as in the United States, strikes were more important than the macroeconomy in generating upward movements in manufacturing wages, whereas, the British ratio implies, as in the case of Italy, the reverse. (1)

Since the impact ratios essentailly are the ratio of strike effects to <u>price</u> effects, (2) if one accepts the interpretation presented earlier that the price coefficients reflect in part the power of trade-unions in wage bargaining, then the ratios give a rough quantitative estimate of the influence of labor militancy relative to union power on wage inflation. Hence, the country rank order in Table 3 is in <u>inverse</u> relation to trade-union power: the greater the effect of (reliance on?) strike activity in wage determination, the less the power of trade-unions, and conversely. (3) Table 3 therefore implies that

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(1) Unless the contribution of unemployment (excess-demand) is excluded from the calculation of macroeconomic effects in Britain.

(2) With the partial exception of Great Britain, where the strike model includes 1/U(t).

(3) The results in Table 3 are of course not altogether independent of the pattern in the price coefficient estimates. To a certain extent the Table is just another way of making the earlier point about international differences in trade union power.

Table 3 Average Impact Ratios from Strike Augmented Wage Equations (Ratio of Strike Effects to Macroeconomic Price Effects)

		1955-64	1965-74
(1)	United States	4.81	1.61
(2)	France	1.75	1.64[a]
(3)	Great Britain	0.39 (1.25)[b]	0.79 (1.31)[c]
(4)	Italy	0.34	0.54

[a] 1968 strike wave not included in strike effects

[b] excluding 1/U(t) from macroeconomic effects

[c] excluding 1/U(t) from macroeconomic effects

method: see text

Italy > Great Britain > France > United States
with respect to the relative power of trade unions in wage bargaining.

Cross-national differences aside, the influence of strike activity on wage movements may cause surprise. It is often pointed out, for example, that working time lost from illness is substantially greater than time lost from industrial disputes. Of course, time lost from sickness does not lead to upward movements in wages; time lost from strikes does. In a more serious vein, there are at least two reasons why strike activity exerts sizeable effects on the rate of inflation. (1) First, wage settlements obtained by one union or unionized sector often become the wage bargaining targets of other unions, either in an absolute sense, or in a relative sense as other groups of workers attempt to maintain established wage differentials. This has been emphasized in Phelps Brown's (1962) work on Great Britain and in Eckstein and Wilson's (1962) 'key industries' theory of wage movements in the U.S. manufacturing sector. Wage settlements in one industry or sector of the economy therefore have proportional effects elsewhere through parity bargaining. Second, wage rates negotiated in unionized plants (strike-induced or not) are known to influence nonunion wage settlements. If employers of unorganized workers did not raise wages in line with the pattern established by union settlements they risk losing workers and, perhaps more important, expose themselves to the

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(1) Taylor, 1974 covers similar ground.

threat of unionization. This is particularly apparent in the United States where nearly one half of the manufacturing labor force remains unorganized.

The estimation range for the wage regressions in Tables 1a-1d was intentionally not taken beyond the year 1972. The 1973-75 observations were saved for forecasting. Actual, fitted, and forecast values of manufacturing wage changes in the four countries are plotted in Figures 2a-2d. (The Figures appear at the end of the paper.) Clearly, the fitted data points from the strike equations track the actual wage change observations rather well, which reflects the relatively high multiple correlations reported earlier. More important, the forecasting performance of the strike models is also reasonably good, especially in view of the fact that the forecast range coincides with exogenous inflationary shocks of unprecedented magnitude -- the extraordinary rise in food prices and the OPEC induced quadrupling of petroleum prices. No doubt this is why the strike models for all countries except the United States (where the impact of international oil price increases was less severe than in Europe) generate comparatively large forecast errors in either 1973 or 1974; the 1975 forecasts are uniformly more accurate. (1)

A better way to evaluate the predictive performance of the strike-augmented wage equations is to make comparisons with the forecasts of an alternative model. The leading rival model is,

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(1) Strike data for France was not available for 1975 and therefore it was not possible to generate a 1975 forecast.

of course, the price expectations Phillips curve of equation 3. Table 4 reports the average and root mean square forecast errors for each model. The strike models are clearly superior to the

Table 4 About Here

price expectations equations for Italy, Great Britain, and in terms of RMSE the United States. Only in the case of France does the expectations equation yield lower average and RMSE forecast errors. Perhaps the pure expectations model is a better approximation of the wage formation process in that country. My own belief, or more accurately prejudice, is that the particular forecast range (1973-74) and the fact that economy-wide strike frequency had to serve as a proxy for manufacturing strike frequency in the regressions for France underlies this outcome. Indeed, I was somewhat surprised that the strike equations generally outperformed the pure expectations equations for three of the four countries in forecasting over the 1973-75 period. The major inflationary impulse during these years came from international prices which would seem to give considerable (short-run) predictive advantage to autoregressive price expectation models. Therefore, I take the forecasting performance of the strike equations to be rather strong evidence that labor militancy should be incorporated into structural models of wage inflation.

Table 4 Forecast Errors from Expectations and Strikes-Augmented Wage Equations, 1973-75 (percent per year)

	Expectations (eq.3)	Strikes (eq.6)
Italy		
average error	-2.08	-0.78
RMSE	4.61	4.37
France (1973-74)		
average error	1.04	2.13
RMSE	1.59	3.01
Great Britain		
average error	-3.42	-1.03
RMSE	3.73	1.52
United States		
average error	0.83	1.19
RMSE	1.68	1.34

RMSE = Root Mean Square Error

III IMPLICATIONS FOR THE ACCELERATION AND STABILITY OF WAGES AND PRICES

Do the strike model regressions yield any evidence that labor militancy has contributed to the acceleration of wages and prices experienced by all four countries since the late 1960's? Insofar as the domestic labor market is concerned, a steady or declining rate of inflation can be maintained if the rate of change of money wages does not exceed the rate of change of prices plus the rate of change of labor productivity. In other words, barring changes in employment, nonlabor costs and the factor distribution of income, a sustained escalation of the rate of inflation will occur when the rate of change of real wages chronically runs ahead of the rate of change of labor productivity.

To clarify matters consider the following simple system. The rate of change of money wages is determined by the strike augmented wage model discussed in the previous section.

$$(7) \quad w'(t) = b0 + b1\ 1/U(t) + \sum_{i} a(i)p'(t-i) + \sum_{j,i} c(ji)S(t-i).$$

Short-run price changes are assumed to follow the mark-up scheme

$$(8a) \quad p'(t) = (w'-x')\ (t-1) + m'(t-1)$$

where: x' = the rate of change of labor productivity

m' = the rate of change of nonlabor costs, principally raw materials; and other terms are as defined earlier.

Substituting for w' in the pricing model gives

$$(8b) \quad p'(t) = b0 + b1\ 1/U(t-1) + \sum_i a(i)\ p'(t-i-1) + c(ji)S\ (t-i-1) - x'(t-1) + m'(t-1).$$

Taking a0 p'(t-1) to the left hand side and subtracting (1-a0) P't-1 from both sides of the equation yields an expression for the rate of acceleration of prices $\Delta p'$

$$(8c) \quad \Delta p'(t) = b0 + b1\ 1/U(t) - (1-a0)\ p'(t-1) + a1\ p'(t-2) + \ldots + ak\ p'(t-k-1) + \sum_{i,j} c(ji)S(t-i-1) - x'(t-1) + m'(t-1).$$

It will prove useful to rewrite the price acceleration function as follows

$$(8d) \quad \Delta p'(t) = S* + Z + m'(t-1)$$

where: $S* = \sum_{i,j} c(ji)\ S(t-i-1)$

$$Z = b0 + b1\ 1/U(t) - (1-a0)\ p'(t-1) + \ldots + ak\ p'(t-k-1) - x'(t-1).$$

It is now clear that labor militancy can be pinpointed as a source of <u>accelerating</u> prices if S* (the strike activity wage change effect) is nonzero and $(S*+Z) > 0$. (1) To illustrate,

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(1) $(S*+Z) > 0$ does not necessarily lead to accelerating prices, $\Delta p' > 0$. Two other outcomes are possible:
$R/Y < 0$ (falling profit share)
or
$\Delta U > 0$. (falling employment, rising unemployment)

suppose $\sum_i a(i) = a0$ and $m' = b0 = b1 = 0$, which leads to a price acceleration function

$$(8e) \quad \Delta P'(t) = S^* + Z$$

$$= \sum_{i,j} c(ji)\ S(t-i-1) - (1-a0)\,p'(t-1) - x'(t-1).$$

(The French and U.S. acceleration expressions would take this form, for example.) Equation 8e implies that trade union strike activity contributes to the acceleration of prices to the extent that the strike activity wage effect on average exceeds the sum of price changes not compensated for by the price adjustment coefficient a0 <u>and</u> the rate of change of labor productivity x'. Put another way, labor militancy underlies accelerating prices if S* pushes real wages up faster than x'.

The relevant data for assessing the direct contribution of strike activity to accelerating prices over the period 1963-75 appear in Table 5. To smooth out cyclical fluctuations

Table 5 about Here

in wages, prices, productivity and so on the data have been averaged over three subperiods: 1963-67 (a period of decelerating prices in all countries except the U.S.), 1968-72 (a period accelerating prices in all four countries), and 1973-75 (the period of the OPEC - induced inflationary burst).

Also note that the argument concerning (S*+Z) and Δp' does not hinge on the precise form of the price mark-up scheme (8a). Related pricing equations -- for example, the "normal" average cost model -- would yield similar results for p' averaged over a few periods.

Table 5 Average Rates of Change of Wages, Prices, Labor Productivity and Strike-induced Inflationary Impulses 1963-1975

	$\overline{w}'_{t-1}$	$\overline{p}'_{t-1}$	$\overline{r}'_{t-1}$	$\overline{x}'_{t-1}$	$(\overline{r}'-\overline{x}')_{t-1}$	$\overline{\Delta p}'_{t}$	$\overline{S}$*	$\overline{Z}$	$\overline{S}$*+$\overline{Z}$
Italy									
1963-67	11.09	5.59	5.50	7.07	-1.58	-0.71	2.29	-3.54	-1.25
1968-72	11.92	3.98	7.95	5.04	2.91	0.70	3.69	-1.49	2.19
1973-75	19.45	10.74	8.70	7.68	1.02	3.19	3.67	-2.47	1.20
France									
1963-67	8.12	3.60	4.52	5.51	-0.99	-0.42	4.63	-6.65	-2.02
1968-72	9.74	4.75	4.99	5.95	-0.96	0.67	6.63	-7.46	-0.83
1973-75	14.33	8.42	5.91	4.53	1.37	1.82	7.25	-7.23	0.03
Great Britain									
1963-67	6.71	3.54	3.16	4.24	-1.08	-0.32	3.16	-4.12	-1.03
1968-72	8.88	5.50	3.37	3.53	-0.16	0.88	5.76	-5.49	0.27
1973-75	13.92	10.18	3.73	3.57	0.17	4.95	8.09	-7.36	0.73
United States									
1963-67	3.65	1.65	2.01	4.27	-2.27	0.31	3.23	-6.29	-3.06
1968-72	6.20	4.41	1.79	1.98	-0.19	0.10	3.93	-5.39	-1.46
1973-75	7.32	6.58	0.74	1.33	-0.59	1.83	3.57	-5.84	-2.27

Key: $\overline{\Delta p}'$ = the first difference of p'; the mean rate of acceleration of inflation.

$\overline{w}'$ = mean rate of change of manufacturing hourly compensation

$\overline{p}'$ = mean rate of change of consumer prices

$\overline{r}'$ = mean rate of change of real manufacturing hourly compensation

$\overline{x}'$ = mean rate of change of manufacturing labor productivity

$\overline{S}$* = see text

$\overline{Z}$ = see text

The data presented in Table 5 show that during the first subperiod, 1963-1967, the rate of price inflation was falling in Italy, France and Great Britain, and rising by just under 1/3 percent per year iin the United States. (see column 6 of the Table). However, in <u>all</u> countries the rate of change of real wages lagged behind the rate of change of labor productivity (the lag was dramatic in the U.S. -- see column 5), and everywhere $\overline{S}* + \overline{Z}$ was less than zero. Clearly there is no evidence that labor militancy contributed to the steady acceleration of prices experienced by the United States over the 1963-67 period.

For the second period, 1968-72, the picture is mixed. Prices accelerated in all four nations during these years. The acceleration was substantial in Italy, France and Great Britain; modest in the United States. $\overline{S}* + \overline{Z}$ is negative in France and United States (as is r'-x'), which again implies that labor militancy did not generate the acceleration. In Great Britain $\overline{S}* + \overline{Z}$ is greater than zero, but too small to explain fully the sharp rise in the rate of inflation. (1) However, in Italy the data in columns 5 and 9 of the Table show that labor militancy was on average pushing up real wages much more rapidly than the rate of growth of labor productivity. There is good reason to conclude, therefore, that the most important source of price acceleration in Italy during this period was trade union "cost push."

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(1) Also notice that (r'-x') is negative.

The 1973-75 average rate of price acceleration was enormous: nearly five percent per annum in Great Britain, more than three percent per annum in Italy, and almost two percent per annum in France and the United States. In view of the dramatic increases in the international prices of food and fuel since 1973, it comes as no great surprise that the data in Table 5 indicate that the general acceleration of prices cannot be attributed to labor militancy. For the United States the estimated net effect of strike activity on price acceleration, $\overline{S^*} + \overline{Z}$, is negative. In otherwords, the pressure on manufacturing money wages from trade union strike action was apparently not great enough in the U.S. to keep real wages growing as fast as labor productivity. $\overline{S^*} + \overline{Z}$ is positive for France and Great Britain, but it is not large enough to account for much of the price acceleration; especially the recent acceleration of British consumer prices. (1) In Italy the evidence again points to a different conclusion. Both r'-x' and $\overline{S^*} + \overline{Z}$ are greater than 1.0, which suggests that strike-induced wage escalation was a significant component of the post-OPEC burst of inflation.

Admittedly, the calculations in Table 5 might yield conservative estimates of average strike-induced inflationary impulses. Wages and productivity pertain to the manufacturing sector, whereas, prices are based on economy-wide consumer

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(1) Notice, however, r'-x' is substantially greater than zero in France.

indices. (2) Since the prices of manufactured goods have generally increased less than the consumer price indices in recent years, the strike activity inflation effects may be understated somewhat. Taken as a whole, however, the evidence strongly implies that only in Italy has trade union strike action systematically contributed to increasing rates of inflation over the 1968-75 period. (1) In order to explain the general acceleration of wages and prices of the late 1960's and 1970's one must look to other factors; macro-policy mismanagement, deficit financing of the Vietnam War, changes in the relative prices of fuel and agricultural commodities, and so on.

Although the results of this paper indicate that manufacturing labor militancy has not been an important <u>proximate</u> cause of escalating rates of inflation, (2) the data in Tables 2 and 5 show that the combined effects of union power and union militancy effectively <u>index</u> manufacturing wages to prices in all four countries. (3) Two implications follow. First, any

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(2) Consumer prices of course are more relevant for modelling wage determination.

(1) Italian unions are not only powerful, they also are among the most militant. For example, the postwar average of mandays lost in strike activity per worker is higher for Italy than any other major industrial, capitalist society. See Hibbs, 1976a and 1976b.

(2) Except in Italy to the extent noted above.

(3) That is, the combined effects of price adjustment and strikes keep the rate of change of real wages positive. The only exceptions over the 1950-75 period are 1969 in France (real wages fell by about 0.5% following a 13% increase the previous year) and 1974 in the United States (a decline of about 1%).

received rate of price inflation tends to be perpetuated. Second, and perhaps more important, inflationary shocks requiring real adjustments, for example changes in the relative prices of fuel and food redistributing income to the producers of oil and agricultural commodities, can generate accelerating inflation rates if both labor and capital are in the short-run unwilling to accept the real income loss. Therefore an "imported" inflation can lead to a "home-grown" inflation as a result of what Hicks (1975) has called "real wage resistance." (1) Until the principal domestic actors acknowledge the shift in the terms of trade and settle the problem of allocating the decline in real income, increasing inflation is almost an inevitable interim outcome, particularly if political authorities attempt to maintain a steady level of output and employment and "validate" the inflation by expanding the money supply. (2)

If the perpetuation and in some circumstances the escalation of inflation is influenced by trade union action, what can be done to bring about wage and price stability? Perhaps nothing should be done. As Tobin (1972) and others have observed inflation is not the worst way of resolving group rivalries and

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(1) As G.D.N. Worswick put it in testimony before the British House of Commons' Public Expenditure Committee: "If all of us just took the rise in the price of oil on the chin that would be one thing, but most of us do not; we say, 'Our income is unchanged and prices have risen. We wish to restore our real income.'" (cited in Miller, 1976, p. 51?.)

(2) A rough formalization of this idea has already been worked out by Miller, 1976, who builds on the earlier work of Sargan, 1964.

social conflict. Moreover, much if not all of the pain attributed to the recent inflation is actually due to the massive _real_ income loss caused by the shift in _relative_ prices in favor of producers of food, fuel and raw materials. Had the real loss absorbed by urban, industrial societies (or sectors of society) taken place around a stable price level the pain would not have been any less unpleasant.

A "do nothing" posture may be viable in the United States. Inflation has been running at below double digit figures (except for 1974), the balance of payments constraint is not severe by international standards, and trade unions are comparatively weak. In France, Italy and Great Britain, however, inflation has reached almost runious proportions. For social as well as economic reasons it must be brought under control.

The results presented earlier in the paper showed that outside the United States there is little evidence of a Phillips curve and that the impact of strike action on wages is largely independent of market forces. Yet there isn't much doubt that if political authorities were willing to run the economy at _very_ low levels of activity for a prolonged period of time the power of unions to obtain wage increases equal to or in excess of the rate of price inflation would be broken. This of course amounts to killing the patient to cure the disease. In any case suicidal policies of this sort are simply not politically feasible in modern capitalist democracies. (1)

If it is necessary to do something about inflation, and orthodox deflationary macroeconomic policies are unlikely to be effective or politically acceptable, the only alternative is probably some form of national wages or incomes policy. In a democratic society the success of a national wages policy hinges on the voluntary cooperation of the trade unions. Headey's (1970) pathbreaking study of the postwar experience shows that two conditions are critical for trade union cooperation:

(i) Whether or not the state directly coordinates the wages policy, the government must command the confidence of the unions. In practice this means that trade union based (Socialist, Labor, Communist) political parties must control (or share in the control of) the government.

(ii) the trade union movement must be centralized to the degree that the peak organizations exercise effective control over the principal bargaining demands and strike decisions of the major constituent unions.

None of the countries treated in this study entirely satisfies Heady's conditions. However, the British Labour Government has been able to sell wage restraint to the trade unions -- indeed severe wage restraint -- for two successive

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(1) Although it probably is not wholly inaccurate to characterize the macroeconomic policies pursued by the Nixon-Ford Administrations after the 1972 election in this way. For an extensive analysis of the political considerations see my forthcoming paper "Why Are U.S. Policy Makers So Tolerant of Unemployment and Intolerant of Inflation."

years, even though the TUC (peak labor organization) does not exercise the kind of centralized authority outlined above. (1) To be sure it took an extraordinary domestic economic crisis, external pressure from the international economic community, and the promise of tax relief to low wage groups to elicit the union's cooperation. Although a national wages policy probably does not have a long-run future in Britain, it has helped to alleviate the short-run, post-OPEC crisis. Perhaps this is all one should expect.

Even a policy of short-run restraint designed to reverse the post-1972 wage and price acceleration is not feasible in France and Italy unless the left opposition is brought into the government. The economic situation is particularly acute in Italy, where annual wage increases have exceeded 20 percent for four consecutive years. The Italian Communist Party (PCI) has been pressing for participation in the government for several years (the "historic compromise"), but thus far the ruling Christian Democrats have rejected PCI overtures. If the Christian Democrats continue to oppose PCI government participation, trade union wage pressure is unlikely to abate, and Italy may slide from economic crisis into economic catastrophe.

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(1) In August 1975 the trade unions agreed to hold weekly wage increases to £6 -- a rise of about 10 percent. Wage restraint was even greater the following year: The August 1976 agreement held wage increases to an average of 4.5 percent. The increase in both years was substantially less than the rate of inflation. It is clear that a Conservative Government could never have pulled this off.

Table 1a   Italy: Manufacturing Average Hourly Compensation (w') Regressions
Annual Data 1954-1972, t-statistics in parentheses

	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)
Constant	-2.272 (-0.54)	-1.019 (-0.45)	1.697 (0.83)	23.055 (3.35)		3.333 (2.90)	3.463 (3.76)	2.55 (1.20)
1/U(t)	46.904 (2.96)	15.349 (1.50)	10.533 (1.30)	-2.421 (-0.36)		0.518 (0.10)		
ΔU(t)	0.442 (0.50)							
$\sum_{i=1}^{2} U(t-i)$								0.043 (0.20)
p'(t)		1.649 (4.52)						
$\sum_{i=0}^{2} p'(t-i)$			1.226 (3.18)	0.591 (1.67)		0.942 (3.38)	0.931 (3.60)	1.041 (3.33)
ΔP/Y(t)				-0.104 (-0.81)				
P/Y(t)				-0.160 (-3.02)				
Strike Volume (mandays lost per worker in manuf.) $_{t-1}$						1.910 (3.99)	1.953 (4.34)	2.108 (3.85)
$\bar{R}^2$	.273	.690	.774	.888		.914	.917	.910
DW	1.85	2.00	1.85	2.18		1.99	2.01	1.94
SER	3.474	2.381	2.302	1.986		1.750	1.749	1.823
GLS*	r_1= +.500	r_1=+.281		r_1=-.372		r_1=-.383	r_1=-.406	r_1=-.415

*r_1, r_2 are autoregressive coefficients from a generalized least-squares estimation.

Table 1b — France: Manufacturing Average Hourly Compensation (w') Regressions

Annual Data 1951-72, t-statistics in parentheses

	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(6c)	(7)
Constant	7.260 (1.35)	6.851 (3.77)	6.640 (3.17)			0.715 (0.31)	0.643 (0.40)		-1.741 (-0.53)
1/U(t)	2.421 (0.65)	-1.404 (-1.05)	-1.411 (-1.01)			-0.469 (-0.04)			
ΔU(t)	0.834 (0.13)								
Dum 68 (=1 1968)						7.399 (3.05)	7.433 (3.31)	7.989 (4.60)	7.820 (3.29)
$\sum_{i=0}^{2} U(t-i)$									2.012 (0.59)
p'(t)		0.889 (6.34)				0.664 (5.40)	0.663 (5.64)	0.681 (6.38)	
$\sum_{i=0}^{2} p'(t-i)$			0.927 (4.95)						0.683 (3.12)
Strike Volume (mandays lost per worker in manuf.)$_{t-1}$						4.236 (2.97)	4.233 (3.06)	4.134 (3.12)	6.593 (1.82)
Strike Frequency (Strikes per 10,000 workers economy-wide)$_t$						2.381 (2.69)	2.389 (2.85)	2.698 (7.87)	2.571 (1.87)
$\bar{R}^2$	0.0	.645	.632			.826	.836	.845	.714
DW	1.93	1.72	1.91			2.00	2.00	1.99	1.86
SER	4.347	2.633	2.681			1.782	1.729	1.689	1.787
GLS*	r_1=+.600					r_1=+.196	r_1=+.198	r_1=+.200	r_1=+.613

*r_1, r_2 are autoregressive coefficients from a generalized least-squares estimation.

Table 1c Great Britain: Manufacturing Average Hourly Compensation (w') Regressions
Annual Data 1951-1972, t-statistics in parentheses

	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(7)
Constant	5.306 (1.57)	4.521 (2.46)	2.948 (1.41)	9.815 (1.09)	2.092 (1.04)	-2.874 (-2.32)	-2.699 (-1.84)	-5.287 (-2.67)
1/U(t)	4.432 (0.92)	-1.327 (-0.54)	-0.763 (-0.34)	1.221 (0.42)	1.157 (0.48)	6.721 (4.54)	6.637 (4.07)	6.694 (2.76)
ΔU(t)	0.504 (0.36)							
$\sum_{i=1}^{2} U(t-i)$								1.941 (1.45)
Dum 68 (=1 1968-72)							1.013 (0.24)	
Dum 68 x 1/U(t)							-2.585 (-0.27)	
p'(t)		0.843 (4.30)				0.683 (7.41)	0.669 (5.59)	
$\sum_{i=0}^{2} p'(t-i)$			1.207 (4.17)	1.080 (3.44)	1.090 (3.90)			0.710 (4.33)
ΔR/Y(t)				0.417 (1.08)				
R/Y(t)				-0.371 (-0.82)				
ΔT/L(t)					0.935 (1.78)			
Strike Volume (mandays lost per worker in manuf.) t-1						4.332 (3.62)	4.064 (2.51)	4.040 (3.85)
Strike Frequency (strikes per 10,000 workers in manuf.) t-1						2.080 (4.85)	2.080 (3.45)	1.161 (1.63)
$\bar{R}^2$	0.0	.451	.640	.662	.683	.911	.899	.938
DW	2.07	1.87	1.96	2.00	1.79	1.83	1.86	1.98
SER	2.514	1.90	1.754	1.785	1.646	1.152	1.220	.996
GLS*	r_1=+.720	r_1=+.26		r_1=-.100		r_1=-.565	r_1=-.555	r_1=-.600

*r_1, r_2 are autoregressive coefficients from a generalized least-squares estimation.

Table 1d United States: Manufacturing Average Hourly Compensation (w') Regressions

Annual Data 1951-1972, t-statistics in parentheses

	(1)	(2)	(3)	(4)	(5)	(6a)	(6b)	(6c)	(7)
Constant	2.471 (1.39)	1.816 (2.15)	1.753 (1.90)	1.991 (1.40)	2.100 (2.56)	-1.181 (-1.48)	-1.190 (-1.56)		-2.807 (-1.01)
1/U(t)	12.330 (1.63)	8.343 (2.44)	8.283 (2.29)	8.874 (2.03)	7.400 (2.07)	2.988 (1.00)			
ΔU(t)	0.034 (0.13)								
$\sum_{i=1}^{2} U(t-i)$									0.026 (0.11)
p'(t)		0.583 (5.83)		0.563 (3.42)	0.514 (4.56)	0.464 (6.01)	0.467 (6.32)	0.496 (5.91)	
$\sum_{i=0}^{2} p'(t-i)$			0.620 (3.44)						0.336 (4.55)
Δ R/W(t)				-0.064 (-0.57)					
R/W(t)				-0.021 (0.21)					
ΔT/L(t)					0.413 (1.98)				
Strike Frequency (strikes per 10,000 workers in manuf.) t-1						3.514 (4.18)	4.050 (6.23)	3.062 (14.74)	5.520 (3.47)
$\bar{R}^2$	.074	.684	.654	.647	.714	.855	.865	.822	.793
DW	2.13	2.06	2.06	2.11	2.08	2.03	2.07	2.09	2.17
SER	1.323	.792	.828	.875	.779	.674	.673	.687	.709
GLS*	r_1=+.484	r_1=+.196 r_2=+.349	r_1=+.203 r_2=+.355	r_1=+.246	r_1=+.275	r_1=-.141 r_2=-.060	r_1=-.191 r_2=-.094		r_1=-.300

*r_1, r_2 are autoregressive coefficients from a generalized least-squares estimation.

Figure 2a: Italy: Actual, Fitted, and Forecast Values of Manufacturing Money Wage Changes, 1954-1975 From Eq. 6b.

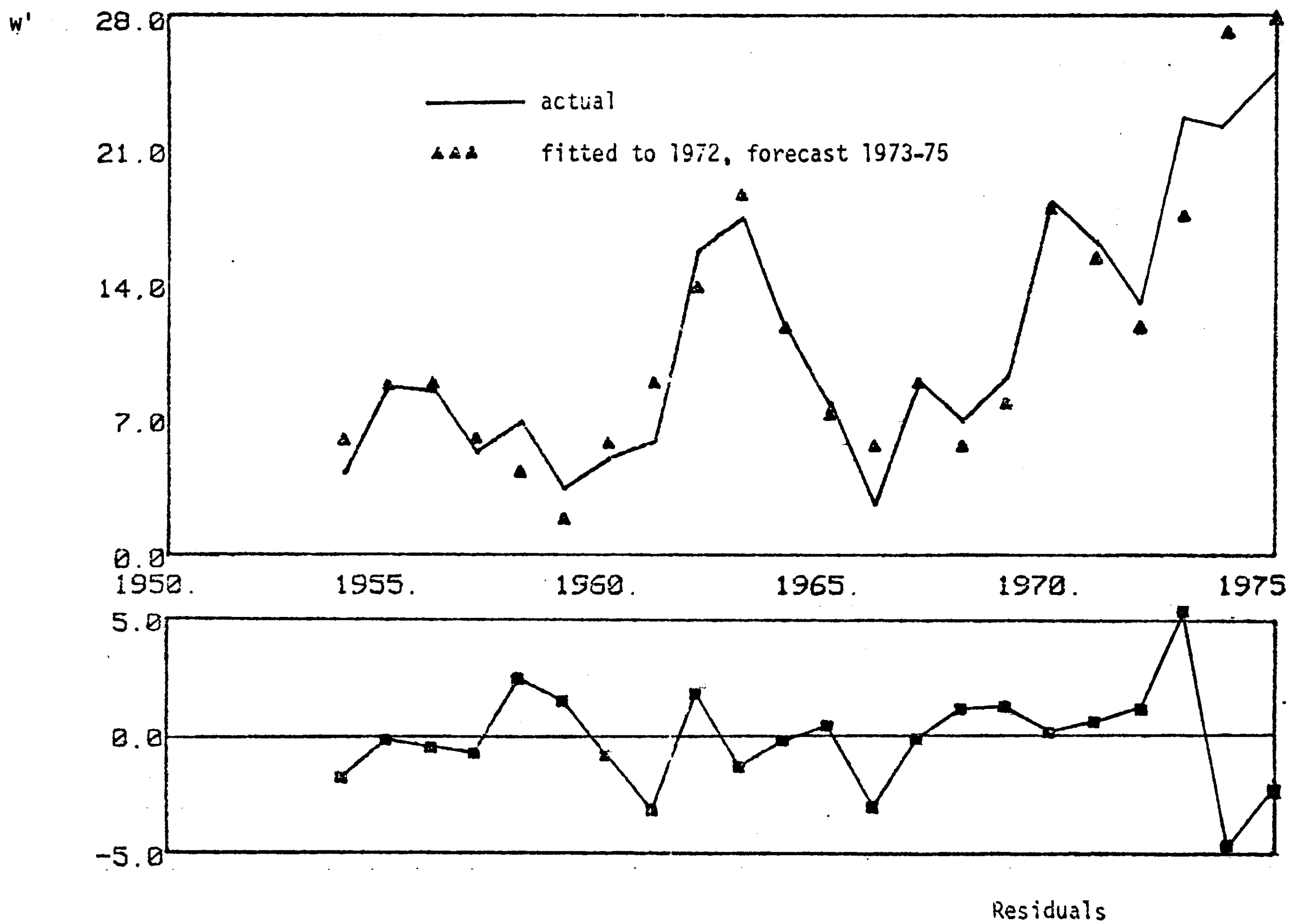


Figure 2b: France: Actual, Fitted, and Forecast Values of Manufacturing Money Wage Changes, 1951-1974 From Eq. 6c.

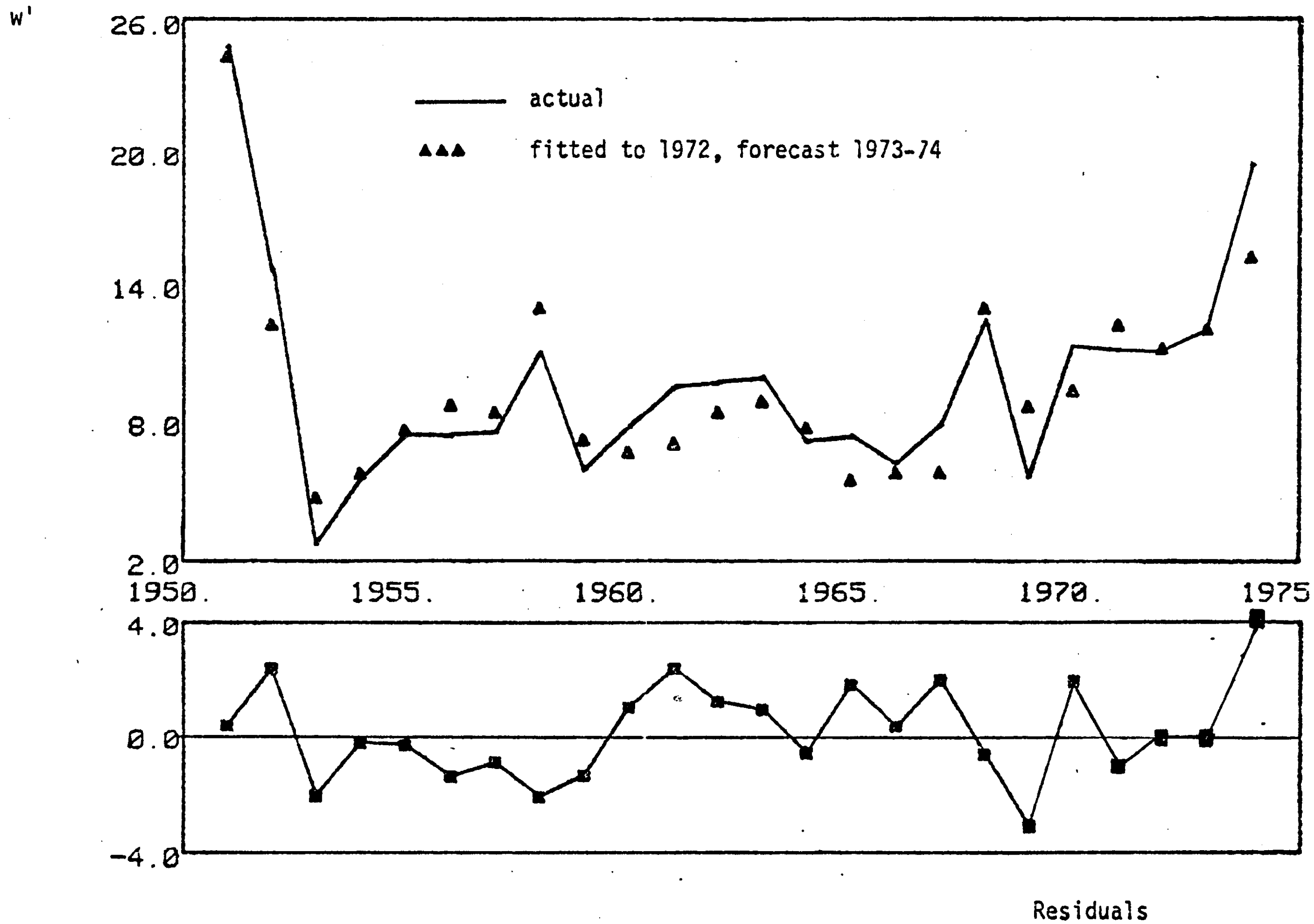


Figure 2c: Great Britain: Actual, Fitted, and Forecast Values of Manufacturing Money Wage Changes, 1951-1975 From Eq. 6a.

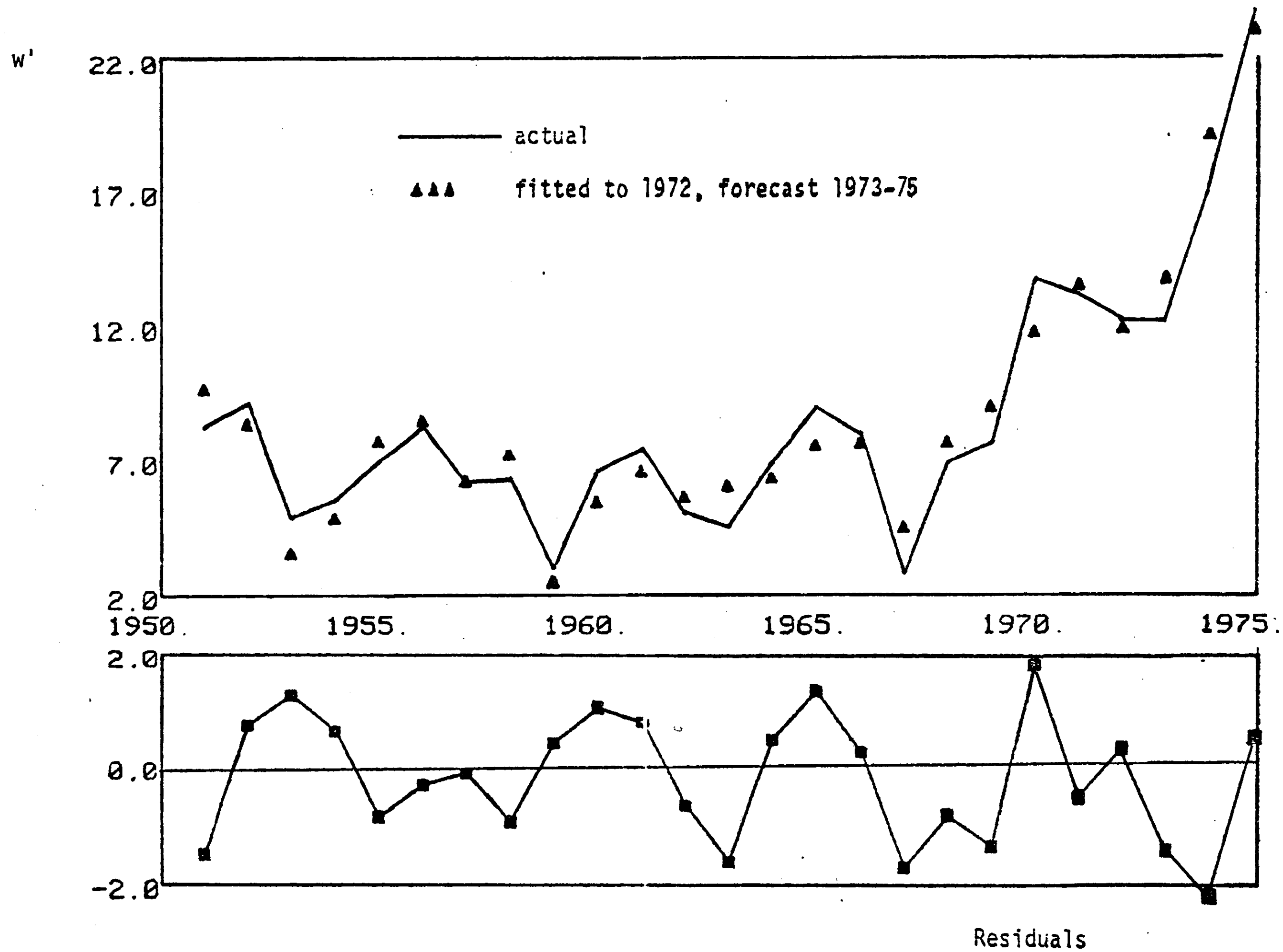
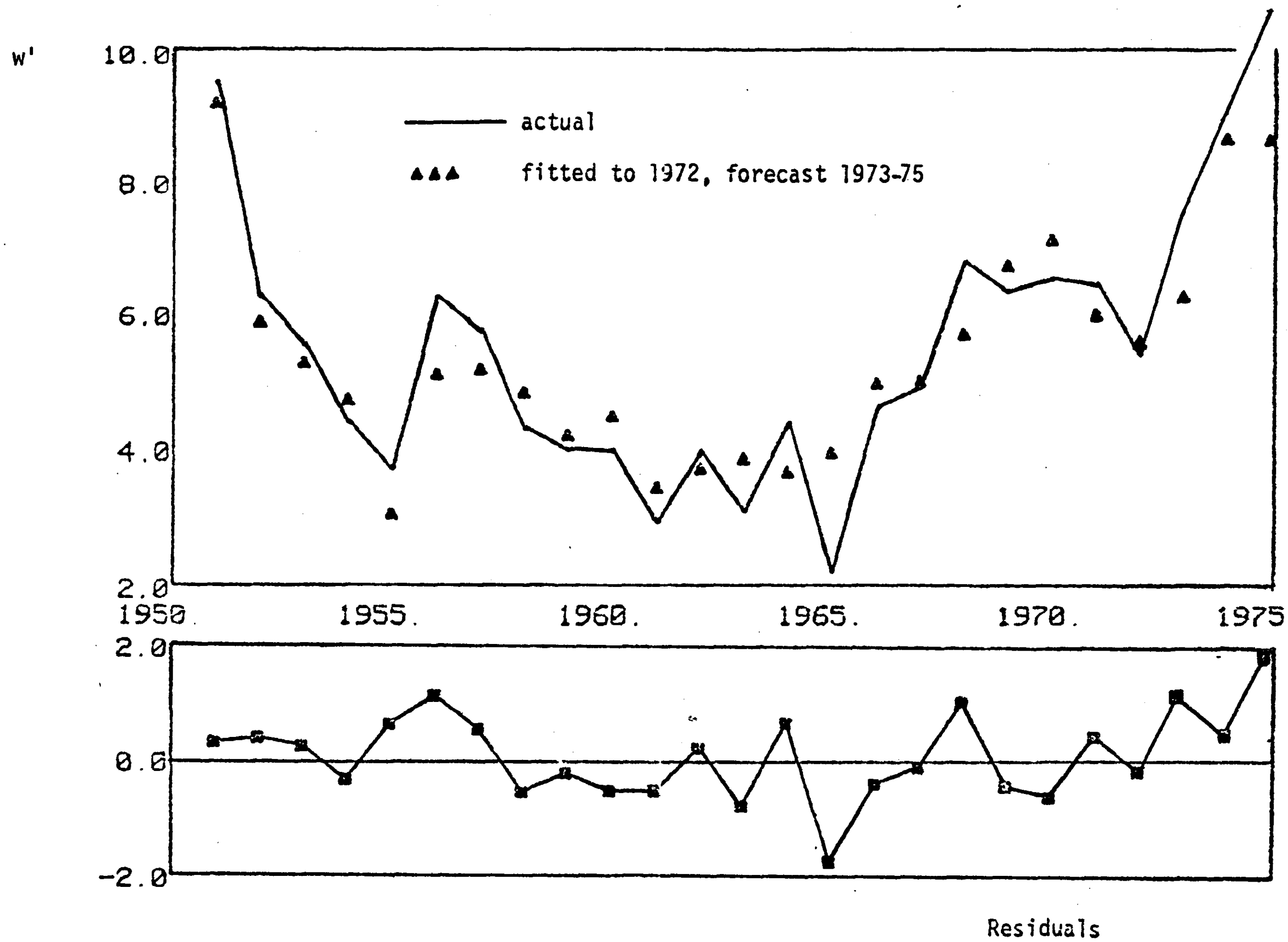


Figure 2d: United States: Actual, Fitted, and Forecast Values of Manufacturing Money Wage Changes, 1951-1975 From Eq. 6c.



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APPENDIX

Data Sources

(except where noted, all variables pertain to manufacturing sector)

<u>Hourly Compensation (w')</u>

<u>Output per Hour (x')</u>

All countries: U.S. Department of Labor, Bureau of Labor Statistics, Office of Productivity and Technology, "Output Per Hour, Hourly Compensation, and Unit Labor Costs, All Employed Persons in Manufacturing, 1950-1975" (September 1976)

<u>Consumer Prices (p')</u>

Italy: <u>Quandri Della Contabilita Nazionale Italiana Per Il Period 1951-1973</u> (Rome, 1974) and I.L.O., <u>Yearbook of Labor Statistics</u>, 1974.

France: I.L.P., <u>Yearbook of Labor Statistics</u>, various years.

Great Britain: <u>Department of Employment Gazette</u>, December 1975 and supplementary sources.

United States: NBER, TROLL Time-Series Data Bank.

<u>Unemployment (U)</u>

Italy: I.L.O., <u>Yearbook of Labor Statistics</u>, 1973 and supplementary sources.

France: I.L.O., <u>Yearbook of Labor Statistics</u>, various years.

Great Britain: <u>Department of Employment Gazette</u>, December 1975 and supplementary sources.

United States: NBER, TROLL Time-Series Data Bank.

<u>Profit Share</u> (<u>R/W, R/Y</u>):

Italy: Sylos-Labini, 1974, p. 122.

Great Britain: M.A. King, "The U.K. Profits Crisis: Myth or Reality," <u>Economic Journal</u>, March 1975.

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Appendix: Data

ITALY

	w'	U	p'	R/Y	V	x'
1950.	NA	6.74961	NA	NA	1.26863	NA
1951.	9.24864	7.15621	NA	113.3	0.67219	10.8916
1952.	7.48653	7.72546	5.10578	104.8	0.41524	3.8559
1953.	6.35138	8.13206	2.50063	100.	0.9663	4.16727
1954.	4.21743	8.13206	2.83823	105.1	0.5261	5.29919
1955.	8.75034	7.02825	3.39842	109.8	0.18893	9.43327
1956.	8.5434	8.78683	4.82721	109.3	0.17016	6.25792
1957.	5.31521	7.07306	2.10037	109.6	0.19985	3.78771
1958.	6.82087	6.19137	2.3838	105.5	0.25678	3.47862
1959.	3.45602	5.29284	-0.18139	113.9	0.96265	7.25193
1960.	4.96998	4.0119	1.87035	114.3	0.53318	3.43781
1961.	5.88408	3.42532	2.51007	110.6	0.82262	3.47204
1962.	15.8223	2.98515	6.27422	100.3	2.54953	9.47704
1963.	17.4158	2.52328	8.42514	96.2	0.84751	3.18756
1964.	11.7176	2.76783	5.62859	91.1	1.16762	6.33125
1965.	7.82652	3.65591	4.70819	92.	0.46581	11.6828
1966.	2.66094	3.94881	2.92377	97.3	1.6494	4.6917
1967.	8.99248	3.51086	2.72999	91.4	0.58437	4.0822
1968.	6.95257	3.54569	2.0998	93.8	0.94175	8.0658
1969.	9.25932	3.43399	3.19471	91.3	4.41506	3.44543
1970.	18.2179	3.18465	5.11274	88.9	1.85572	4.87051
1971.	16.1917	3.1945	6.74095	77.6	1.1261	4.72536
1972.	13.1419	3.70016	6.07891	83.1	1.74932	7.48596
1973.	22.7784	3.5	10.5685	NA	2.76694	9.66072
1974.	22.4153	2.9	15.578	NA	1.91989	4.7945
1975.	25.3815	3.3	15.659	NA	NA	NA
Mean	10.792	4.840	5.128	99.964	1.161	5.993
Coefficient of Variation	0.595	0.422	0.779	0.105	0.846	0.438

FRANCE

	w'	U	p'	V	F	x'
1950.	NA	0.82435	9.40285	1.68273	2.40178	NA
1951.	24.8739	0.64666	16.7056	0.21718	2.28151	5.10664
1952.	14.7424	0.70972	10.4259	0.15672	1.58023	3.1951
1953.	2.76518	0.96375	-0.99468	0.61418	1.6047	5.10836
1954.	5.59788	0.98354	0.	0.18004	1.33375	2.75068
1955.	7.45182	0.85727	0.99468	0.44005	2.38049	4.9159
1956.	7.4297	0.60668	1.87292	0.16453	2.14883	6.25763
1957.	7.6046	0.43914	3.04794	0.39481	2.24322	1.54781
1958.	11.0383	0.49165	14.0349	0.07339	0.80459	3.84979
1959.	5.966	0.74952	5.92499	0.30518	1.27434	6.97594
1960.	7.7961	0.68995	3.69558	0.12951	1.23942	5.07565
1961.	9.53102	0.58958	3.13625	0.17309	1.60415	4.55275
1962.	9.7374	0.64932	4.73185	0.12165	1.50215	4.48751
1963.	9.9452	0.72667	4.68826	0.16972	1.83005	5.81179
1964.	7.2011	0.58345	3.34349	0.16105	1.69101	4.89693
1965.	7.41081	0.72183	2.48337	0.10404	1.21763	5.57642
1966.	6.252	0.74477	2.69909	0.19401	1.21814	6.77109
1967.	7.90434	0.98251	2.62814	0.39972	1.17635	5.44567
1968.	12.4868	1.26882	4.46072	NA	NA	10.7957
1969.	5.66196	1.09766	6.21834	0.17702	1.68937	3.52774
1970.	11.4162	1.26894	5.09319	0.21145	2.16928	4.9037
1971.	11.2477	1.6222	5.3544	0.36414	2.79718	5.06744
1972.	11.1856	1.82224	5.97305	0.2988	2.18177	6.52742
1973.	12.1871	1.84506	7.0447	0.3397	2.30076	5.64232
1974.	19.6259	2.29316	12.2504	0.2925	2.04407	3.34616
1975.	16.4355	3.9011	11.4252	NA	NA	NA
Mean	10.140	1.080	5.640	0.295	1.709	5.089
Coefficient of Variation	0.476	0.685	0.772	1.082	0.358	0.350

GREAT BRITAIN

	w'	U	p'	R/Y	T/L	V	F	x'
1950.	NA	1.5	2.8676	24.3	45.9839	0.04006	0.33562	NA
1951.	8.27856	1.2	9.4346	23.9	46.7	0.06849	0.44324	0.964642
1952.	9.1567	2.	8.32529	18.7	47.1055	0.10377	0.30245	-4.249
1953.	4.87909	1.6	3.20263	19.1	46.5277	0.20583	0.33852	4.56848
1954.	5.55696	1.3	1.7046	22.5	45.9259	0.10377	0.36772	3.29447
1955.	6.95934	1.	4.40836	21.7	46.1239	0.10466	0.47794	3.18928
1956.	8.26244	1.1	4.73776	20.	45.7447	0.17611	0.39649	0.
1957.	6.18753	1.3	3.78361	19.7	45.7894	0.81698	0.43576	2.36349
1958.	6.34022	1.9	2.92702	19.8	45.2613	0.08233	0.46643	1.73664
1959.	3.02544	2.	0.4796	21.7	44.9316	0.57304	0.60835	3.93867
1960.	6.56757	1.5	0.95234	21.5	44.921	0.20765	0.83868	5.76181
1961.	7.46613	1.4	3.49283	19.6	44.6104	0.19063	0.83187	0.778198
1962.	5.05018	1.9	4.03643	18.9	44.6117	0.5622	0.85856	2.4251
1963.	4.54626	2.3	1.94941	21.1	44.7323	0.1162	0.86518	5.28059
1964.	6.94284	1.6	3.22914	21.9	44.7922	0.17314	1.14556	7.04269
1965.	8.97512	1.4	4.65622	22.5	44.7357	0.23397	1.237	2.96564
1966.	8.03003	1.4	3.84998	20.4	44.1319	0.11382	1.01584	3.50914
1967.	2.83995	2.2	2.45886	19.9	44.6773	0.19522	1.41603	4.3952
1968.	6.95257	2.4	4.58345	20.7	45.0022	0.45534	1.72573	6.48508
1969.	7.71685	2.4	5.29718	18.4	46.2973	0.51622	2.30217	1.30358
1970.	13.698	2.5	6.17847	17.4	49.7486	0.77887	3.10349	0.920773
1971.	13.1742	3.4	8.99782	16.4	50.2983	0.81641	1.81852	4.56867
1972.	12.283	3.8	6.86455	17.9	51.3065	1.0126	2.14837	4.03309
1973.	12.2894	2.6	8.7924	21.6	50.4986	0.72841	2.37225	6.74782
1974.	17.1768	2.6	14.8881	NA	51.5796	0.95261	2.47237	0.31395
1975.	23.7989	4.2	21.717	NA	NA	NA	NA	NA
Mean	8.646	2.019	5.531	20.4	46.481	0.373	1.133	3.014
Coefficient of Variation	0.539	0.406	0.826	0.096	0.049	0.846	0.722	0.853

UNITED_STATES

	w'	U	p'	R/W	Y/L	F	x'
1950.	NA	5.20833	1.05772	24.8172	31.1656	1.77482	NA
1951.	9.53102	3.28333	7.64341	17.2276	33.5939	1.55432	3.34377
1952.	6.26431	3.025	2.25592	13.832	33.0107	1.60233	1.48373
1953.	5.53646	2.925	0.7719	13.575	34.466	1.4884	1.89648
1954.	4.39043	5.59166	0.35267	14.3735	35.4108	1.04389	1.57709
1955.	3.71046	4.36666	-0.25921	18.0331	33.7288	1.43348	4.99411
1956.	6.25706	4.12499	1.4636	16.1794	33.8835	1.15177	-0.815201
1957.	5.74169	4.3	3.34024	14.7959	33.3551	1.14475	2.15931
1958.	4.31108	6.84166	2.69442	12.0012	33.1742	1.22609	-0.535488
1959.	3.99771	5.45	0.92049	14.5778	32.3879	1.22519	4.59099
1960.	3.97406	5.54166	1.4966	12.7131	31.5863	0.95712	1.02043
1961.	2.94323	6.69166	1.06611	12.0963	30.0328	1.02719	2.25859
1962.	3.95603	5.56666	1.16539	13.1462	29.7443	1.06153	4.48828
1963.	3.10287	5.64166	1.24264	13.8001	28.9483	0.99088	6.65388
1964.	4.3685	5.15833	1.30816	15.249	28.6723	1.03855	5.0849
1965.	2.22483	4.50833	1.57394	17.5164	28.4453	1.15159	3.42178
1966.	4.62198	3.79166	2.94724	16.8409	28.051	1.19444	1.71814
1967.	4.91905	3.84166	2.73781	14.5714	27.8892	1.1971	0.200176
1968.	6.76584	3.55833	4.12321	13.6099	27.8377	1.34675	3.5367
1969.	6.33698	3.49166	5.28116	10.9288	27.5134	1.39931	1.3423
1970.	6.53601	4.98333	5.72805	8.2577	26.8415	1.28224	-0.477314
1971.	6.4436	5.95	4.16784	9.71506	26.9734	1.28742	5.31092
1972.	5.39865	5.58333	3.25222	11.6429	26.3654	1.077	4.87041
1973.	7.45249	4.85833	6.03428	13.2695	25.7725	1.13713	1.79873
1974.	9.12371	5.6	10.4677	NA	25.6284	1.40826	-4.07152
1975.	10.6102	8.50833	8.73871	NA	NA	NA	-0.620842
Mean	5.541	4.938	3.137	14.285	30.179	1.248	2.209
Coefficient of Variation	0.374	0.262	0.868	0.229	0.101	0.167	1.120