Wage Inflation in Italy: A Reappraisal*

1. Introduction

There is little disagreement in Italy about the nature of the problem of wage inflation. In seeking an explanation many different specifications focusing upon a few alternative dependent and independent variables have been used;[1] the conclusions however are always the same. The conventional wisdom is that there are two elements to any sensible analysis of wage inflation (both in a single equation and in large scale models),[2] namely: a long-run trade-off between inflation and unemployment and monopolistic pricing in the labour market.

This paper challenges the conventional view by reassessing the empirical evidence. Particular attention is paid to three influential studies, all by Modigliani and Tarantelli: (hereafter M and T) (1973, 1975, 1977).

Our conclusions are distructive as to all the usual empirical constructs in this area. There seems to be no trade-off between inflation and unemployment. Notably, even when the Phillips curve is "generalized", with proper estimation, the coefficient on the cost of living variable is much higher than usual. Union militancy, no matter how it is proxied, performs poorly.

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[1] Most of the equations which have been estimated can be found in ERCOLANI (1976).

[2] Examples are to be found in the model of the Bank of Italy (see the works of MODIGLIANI and TARANTELLI (1973, 1977) and TARANTELLI (1970)), in the Bologna Model (see ONOFRI (1976)) and in the Ancona Model (see ERCOLANI (1976)).

2. The Debate on the Long-Run Trade-Off

If we exclude a small minority group of students, (Chiamparino (1973) and Salvati (1974) for instance) who consider the Phillips curve to be nothing but the outcome of political developments we will find that the notion of a well behaved and stable long-run[3] relationship between wage inflation and excess demand has always been widely accepted in the Italian context. Any reservations as to the possibility of using the Phillips curve as a menu for policy choices only relate: to the capacity of the unemployment rate to measure the level of excess demand in a consistent way over the cycle (Ranci (1969), Dell'Aringa (1969)); to the role of local labour markets (Ferri (1970), Ferretti (1974)) or to the presence of a large pool of public employees who cannot be fired (Rossitto (1970)). In other words, what has been questioned is the precision (and political feasibility) of an anti-inflation policy action which is based on the concept of a negatively-sloped long-run Phillips curve. The existence of the curve itself is taken for granted.

The commitment to the hypothesis of money illusion is widespread so, not surprisingly, at the empirical level the rate of inflation is only entered in an attempt to cope with the institutional aspects of the process of wage determination and, for well-known reasons, its coefficient is expected to be between 0.6 and 0.7. However Ragazzi (1969) writes " ... probably from a theoretical viewpoint the demand for labour should be expressed as a function of money wages ... however if we consider the supply of labour it seems reasonable to say that it depends on real wages ". Similarly, according to Bianchi *et al.* (1976) a unit coefficient is simply 'not realistc';[4] M and T describe the inclusion of the price variable in a wage equation as a 'thorny issue' (M and T (1973)) and they expect the coefficient to be 'positive' and fractional (M and T (1975)). Often the homogeneity postulate is avoided because

[3] Of course, in the short run, because of the working of institutional forces, the relationship is viewed as being fundamentally unstable (Izzo *et al.* (1976)), Tarantelli (1974, 1978).

[4] As we will see below the use of two dummy variables will " take care " of the problem.

of the wrong belief that it inevitably leads to a monetarist and/or purely competitive approach to the problem of inflation.[5]

An estimated coefficient as low as 0.6 - 0.7 has turned out to be difficult to obtain. Indeed, Dell'Aringa (1970), Sylos Labini (1967, 1972), Del Monte (1973), Valcamonici (1973), Ferretti (1974), Ercolani (1976), Bianchi *et al.* (1976) and Onofri (1976) all find values for this coefficient which are systematically higher than expected and have difficulty in explaining this result. According to Dell'Aringa (1969) it is due either to a simultaneity problem and to the utilization of OLS[6] or to the use of percentage rather than absolute changes in the cost of living index. Even when these two aspects are taken into due consideration the estimated coefficient does not deviate from .9. Sylos Labini (1967), Ragazzi (1969), Ciravegna (1970) and Ferri (1970) formulate the hypothesis that trade union militancy varies with the rate of change of the cost of living so that the latter must be capturing the effects of the missing push variable.[7] This is an unusual presumption. Moreover, this view can not be reconciled with the generally accepted hypothesis of money-illusion.[8] Tarantelli (1970) also argues that there is a missing variable.[9] He finds that once U_m (the minimum rate of unemploment previously reached) is included among the regressors the estimated coefficient falls rather dramatically. However Ercolani (1976) and Spinelli and Zis (1978) have shown that if the model is properly specified (with U_{t-1} or $\dot{U}$ replacing U_m) the problem remains.

In all of these studies little or no attention has been paid to the fact that a wage contract lasts for a specific number of years.

[5] As to the relationship between monetarism and homogeneity postulates see Modigliani and Papademos (1975, 1976), Tobin (1975), Gordon (1976), Stein (1978), Fratianni (1978) and Fautz (1978). As to the latter aspect we could recall that in his survey De Menil (1971) points out that whilst a variety of different bargaining models could be applied to the wage determination process their varying assumptions all lead to the prediction that the rate of wage change is homogeneous of degree one in all relevant money prices. The homogeneity prediction is also found in Johnston (1972). On this aspect of the debate see Laidler and Parkin (1975).

[6] The reader might as well take a look at Ercolani (1976).

[7] See Dell'Aringa (1968) on this point.

[8] See for instance the study by Crouch and Pizzorno (1977).

[9] Notice that although we are dealing with an unemployment variable its role is not too dissimilar from that of a typical cost-push variable. As a matter of fact, Tarantelli (1970) himself suggests that there exists a positive correlation between union militancy and the gap $U_m - U_t$.

As a consequence, the *expected* rate of inflation is the appropriate explanatory variable. The only two authors who take this into consideration are Onofri (1976) and Spinelli (1976, 1980). The former comes out in favour of the hypothesis of a negatively sloped long-run Phillips curve but his wage equation suffers from two serious drawbacks: there is no estimation of a distributed lag parameter; and an outmoded expectations formation mechanism *à la* Hicks (1946-Goodwin (1947)[10] is employed which has been shown to be outperformed by an error learning mechanism in the case of Italy (Spinelli (1976)), the U.K. (Carlson and Parkin (1975), Smith (1978)), Finland (Paunio and Suvanto (1977)) and Australia (Danes 1975)). In contrast, Spinelli's (1976) Friedman-Cagan type of equation generates a unit coefficient on the expected rate of inflation and a fractional adaptive expectations parameter.[11]

This study has some shortcomings which are being cleared up. Since the expected rate of inflation is unobservable in the model, the results represent a joint test of the role of expectations and the expectations generating scheme.[12] In a more recent study (Spinelli (1979)) this problem has been treated by making use of the directly measured expectations which appear in Visco (1976). Once again, the homogeneity postulate is supported by the empirical evidence. The specification of the equation is a second, more important problem, which has not been handled yet. Work done by Gordon (1971, 1973), Dernberg (1974) and Parkin *et al.* (1976) suggests that the rate of wage inflation depends upon the expected rate of change of *all* variables that affect the excess demand for labour. The important variables are payroll taxes, income taxes, foreign and domestic wholesale prices and domestic retail prices. This shows that a great deal of work is still to be done before wage inflation is fully understood. In the present state of knowledge (which includes the work which has been done on the Italian price equation by Cross and Laidler (1976) Spinelli (1976, 1979), Fratianni (1978) and Korteweg and Meltzer (1978) a balance judgement would be that there is no long-run Phillips curve.

[10] This mechanism translates into the contemporaneous presence of both the rate of price change and its first time derivative. By using annual data SPINELLI (1976) shows that $\dot{p}$ is not significant and that the estimated coefficient on $\dot{p}$ is biased in a downward direction.

[11] The parameter is equal to 0.66 which implies a fairly rapid learning process.

[12] On this aspect see SANTOMERO and SEATER (1978) and SARGENT (1973).

We now turn to the study by M and T (1973). That paper focuses on the nature of the relationship between excess demand and wage inflation. It concludes that, (contrary to the implications of the natural rate hypothesis) for a developing country a permanent reduction of U below some initial rate (achieved after an even larger temporary drop) does not generate an increasingly rapid inflation. On the contrary, this is consistent with any stable value of $\dot{p}$ and $\dot{w}$ including $\dot{p}=0$. One possible view is that the Phillips curve shifts systematically towards the origin.

This work has been criticized before.[13] However, the purpose of this paper is to challenge their major conclusion that there exists a long-run trade-off between wage inflation and unemployment in Italy. Of course the issue we raise revolves around the value of the coefficient on the expected rate of inflation. It should be noted that features present in particular wage equations can influence the value of this coefficient in either direction in relation to the initial value of unity implied by the natural rate hypothesis. Thus our investigation requires that the theoretical framework employed by M and T (1973) be scrutinized.

2.1 *A Critique of Modigliani and Tarantelli (1973)*[14]

In developing their analysis of the implications of the heterogeneity of the labour force in establishing the adequacy of the level of unemployment to measure the true level of excess demand in the labour market these two authors derive the following reduced-form equation:

$$\dot{w}=a+B\frac{1-\beta\left(\frac{u_m-\gamma}{100}\right)}{u-\beta(u_m-\gamma)}+D\dot{p} \qquad (1)$$

where $\dot{w}$ and $\dot{p}$ are the rates of change of money wage rates and of the deflator for private domestic consumption respectively, u is the level of unemployment while u_m denotes the minimum level

[13] A few years ago VINCI (1976) questioned the internal consistency of the paper (Industrial Wages versus a General Price Index) and the meaning of the distinction, which is central to the generalization, between trained and non-trained workers in an era of mass production.

[14] This section draws rather heavily on SPINELLI and ZIS (1978).

of unemployment previously reached. The parameter β indicates the weight to be attached to an untrained worker for the purposes of adjusting aggregate unemployment. Finally, γ is described as the level of 'frictional' unemployment. In their empirical work M and T utilize data for unemployment both for the whole economy and for the non-agricultural sector alone and their findings are not affected by the inclusion/exclusion of the agricultural sector. Their annual data cover the years 1952-1968.

M and T, however, do not estimate equation (1). They argue that equation (1) "has the property that for a developed country operating in the neighbourhood of full employment, so that $u_m=\gamma$, it reduces to the standard Phillips-Lipsey version. However, in our view, this version suffers from one shortcoming: it implies that u has a lower bound of zero and, hence, could be smaller than minimum frictional unemployment, which is an obvious contradiction." Thus in order to eliminate this contradiction they proceed to estimate the following equation:

$$\dot{w}=a+B\frac{1-\beta(\frac{u_m-\gamma}{100})}{u-\gamma-\beta(u_m-\gamma)}+D\dot{p} \qquad (2)$$

We would argue that what Modigliani and Tarantelli identify as a "contradiction" is as relevant to their theoretical framework as to that associated with the studies by Phillips and Lipsey. Setting $u_m=\gamma$ implies that for a developed country the Phillips curve wage equation reduces to $\dot{w}=a+B\frac{1}{u-\gamma}+D\dot{p}$. However, the Modigliani-Tarantelli argument is not free from an element of circular reasoning. First, they, choose a level of unemployment and postulate that this is the minimum that can be reached and, then, identify the existence of a logical contradiction in allowing a level of unemployment below that which is defined as the minimum attainable. Whatever the merits of this argument may be, we would contend, however, that consistency requires that equation (1) is compared with the conventional Phillips curve type of wage equation. Alternatively, if equation (2) is chosen, its performance must be contrasted not with the usual wage equation but with $u-\gamma$ being the measure of excess demand in the labour market. If the second alternative is chosen, then it follows that whatever differences may emerge will not be due simply to the adjustments to the proxy of

excess demand required by the heterogeneity of the labour force in a developing economy.

M and T estimate equation (2) and contrast its performance with that of the following:

$$\dot{w}=a+BU^{-1}+D\dot{p} \qquad (3)$$

They conclude that their equation performed better than equation (3). This conclusion rests on comparisons of R^2 and standard errors. Further, they claim that their equation is superior as it leads to more intuitively plausible values for the parameters a and D. The coefficient on $\dot{p}$ assumes a value of 0.80 when equation (2) is estimated in contrast to a value of 1.13 when equation (3) is estimated. The former value is described to be "in line ... with *a priori* expectations." Similarly, the increase in the value of the constant from 1.07 to 3.4 when equation (2) is estimated, is interpreted as reflecting more accurately "the strong trade union power and the labour market segmentation that ... characterizes the Italian economy." This leads them to conclude "that even in the early stages of development, the trade union awareness of the long-run rate of increase of productivity tends to set a lower limit to the rate of increase of wages" so that even when unemployment is high, trade union power succeeds in forcing increases in wages commensurate to the productivity trend." Finally, M and T draw attention to the fact that equation (3) "substantially underestimates the unusually high rate of change of wages in 1963" while their equation does not suffer from such a weakness. These empirical findings provide the basis for a number of conclusions, the most important of which is that there exists a long-run trade-off between wage inflation and unemployment in Italy.

We have argued that if it is indeed the case that measuring excess demand in the labour market by the level of unemployment involves a mis-specification, arising from a lack of recognition that the minimum level of unemployment that can be attained is greater than zero, then, this is a proposition of general applicability and not a necessary feature of the M and T framework only. We, therefore, begin by estimating equation (3) and then contrast it with the following equation

$$\dot{w}=a+B\frac{1}{u-\gamma}+D\dot{p} \qquad (4)$$

We estimated different versions of equation (4), in each of which we allowed γ to assume a different value. We have used the data employed by M and T and our sample period, 1952-1968, coincides with theirs. We have confined ourselves to unemployment data that exclude the agriculture sector.[15]

Comparing equations (3) and (4) suggests that the inclusion of γ will necessarily influence the values of a, B and D in specific directions.[16] The inclusion of γ results in the wage inflation-inverse of the unemployment rate relationship to shift to the right and to pivot in a clockwise fashion so that the constant term will rise and the values of both B and D are biased in the downward direction. Thus, we would expect the value of b to be smaller the greater γ is. Similarly, the greater γ is the lower D would be and the larger the value that a would assume. These predictions regarding the impact of γ on the various estimated parameters are confirmed by the empirical results presented in Table 1.

TABLE 1

(t-values in parentheses)

Equation No.	Constant	$\frac{1}{u}$	$\frac{1}{u-1.5}$	$\frac{1}{u-2.0}$	$\frac{1}{u-2.5}$	$\dot{p}$	R^2	SEE	D.W.
1.1	1.013 (0.699)	20.297 (2.568)				1.088 (3.216)	0.670	2.31	1.77
1.2	2.073 (1.820)		11.301 (2.708)			0.927 (2.708)	0.720	1.75	2.20
1.3	2.643 (2.584)			8.491 (2.366)		0.807 (2.366)	0.745	1.73	2.10
1.4	3.617 (4.018)				5.322 (4.062)	0.605 (1.839)	0.790	1.68	1.90

Evidently, therefore, the reduction in the value of the coefficient on $\dot{p}$ and the increase of the constant which M and T identify when comparing their preferred equation [equation (2)] to the conventional Phillips curve equation [equation (3)] are not due to their theoretical innovations resting on the heterogeneity of the labour force but to the inclusion of γ .

[15] For sources and data definitions see MODIGLIANI and TARANTELLI (1973).
[16] γ is not entered in a linear fashion and, of course, the effects of its inclusion on the ratio $1/(U-\gamma)$ becomes stronger as U decreases.

Assuming that the inclusion of γ cannot be sustained, we are led to comparing equation (1) with equation 1.1. In estimating equation (1) we adopted for γ the value chosen by M and T as well as their estimate of β. Equation (1) estimated as follows:

$$w = \underset{(0.376)}{-0.542} + \underset{(3.672)}{19.832}\,\frac{1-0.50\left(\frac{u_m-2.0}{100}\right)}{u-0.50(u_m-2.0)} + \underset{(4.100)}{1.137}\dot{p} \qquad (1)$$

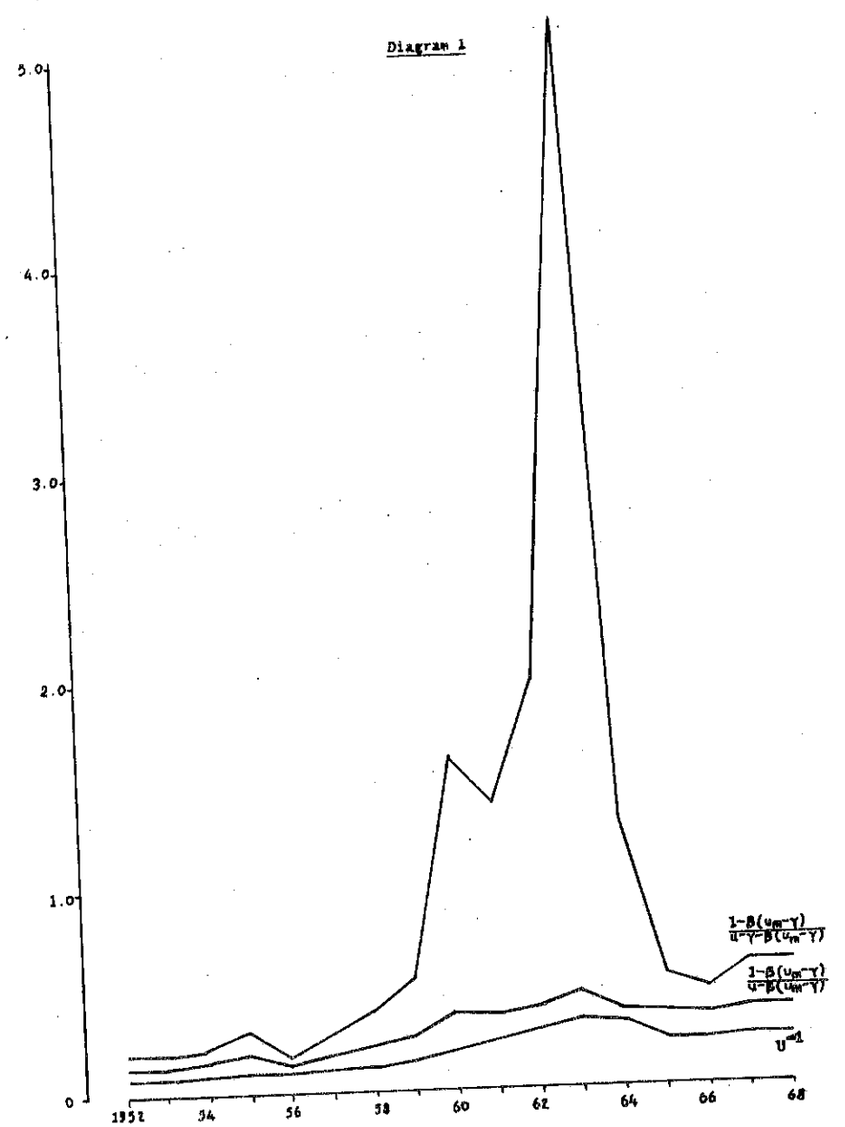
$$R^2 = 0.760 \qquad SEE = 2.00 \qquad D.W. = 1.85$$

Equation (1) is hardly consistent with some of the conclusions reached by M and T. The coefficient on $\dot{p}$ is too high and, in terms of their arguments, the low value of a would indicate that either trade unions were extraordinarily docile, or that employers were exceptionally intransigent, or a combination of the two during the period 1952-68.

In order to stress even further the role of the unjustified inclusion of γ in the denominator the excess demand variable, we present Diagram 1 that shows the values of unemployment used in equation 1.1 and (1), as well as that implied by the estimation of equation (2). It is evident that, however it is measured, unemployment reached its lowest value in 1963 when wage inflation reached a peak. However, if we adopt the M and T explanation (equation (2)) the fall in unemployment in 1963 is *much more dramatic* than if we measured the unemployment variable either as implied by equation (1) or equation (3).

This explains why the estimated parameters presented by Modigliani and Tarantelli are so different from or biased with respect to those associated with equations (1) and 1.1 and why the improvement in the explanatory power of their model is largely to be associated with the 1963 observation only. These findings provide a rationale for and are consistent with those of Vinci (1976) who argue that " the alleged superiority of the estimate associated to the generalized relationship is based upon the comparison with a standard Phillips curve without a dummy, but if a comparison is made between the generalized version and a traditional Phillips curve with a dummy as an extra variable the two estimates coincide to a great extent ". It may be argued that the use of a dummy is, in some sense, a convenient technical means of

DIAGRAM 1



"rescuing" the traditional Phillips curve. Our response to this is that the use of the particular unemployment variable employed by M and T, given the values it assumes in 1963, amounts to including a dummy variable for that year.

Our second major objection to this study is that given the sensitivity of D to the value attached to γ, a consistent comparison of equations (2) and (3) necessitates that γ (as well as β) is freely estimated and not given some arbitrary value, as was done by M and T, however intuitively plausible this may be. Thus we re-estimated equation (2). Our findings [17] are presented in Table 2, equation 2.2, in which we also, for comparison purposes, reproduce the estimates presented by M and T, equation 2.1.

TABLE 2

	a	B	γ	β	D	R^2	SEE	D.W.
2.1	3.4 (5.2)	2.38 (6.4)	[2.0]	[0.56]	0.80 (3.8)	0.89	1.39	1.86
2.2	3.948 (3.925)	2.995 (1.941)	2.120 (5.354)	0.428 (2.800)	0.582 (2.000)	0.88	1.55	2.01

The values for γ and β that minimize the standard error are not particularly different from those found in the M and T study. However, the standard error on the coefficient on the excess demand variable, B, increases dramatically with the result that, in line with the work of Ercolani (1976), the t-value collapses from 6.4 to less than 2.0.

The doubts stemming from equation 2.2 regarding the robustness of the M-T empirical findings prompted us to fit equation (2) over the period 1952-1976. Results are given in equation 3, Table 3. The addition of the years 1969-1976 (which makes the problem of the available degrees of freedom less severe) results in the B, β

TABLE 3

	a	B	β	γ	D	d 1970	R^2	SEE	D.W.
3.	3.155 (1.933)	5.730 (1.222)	0.304 (1.067)	1.935 (1.907)	0.842 (6.656)		0.839	2.725	2.104
3.a	3.729 (3.814)	2.135 (1.174)	0.481 (2.588)	2.012 (3.648)	0.922 (9.482)	8.508 (3.787)	0.907	2.128	2.288

[17] These nonlinear estimators are the same as MLE. See KMENTA (1971).

and γ coefficients being insignificant, and causes the D coefficient to be not significantly different from one. Thus equation 3 cannot be judged as impressive on any criterion. However, it could be said that the 1969 " hot autumn " did give rise to such observations for 1970 as to bias the performance of the equation. Thus we re-estimated equation (2) with a dummy for 1970. From equation 3.a we note that the inclusion of such a dummy affects the statistical significance of β and γ but not of the coefficient on excess demand. Furthermore, the coefficient on $\dot{p}$, D, is now even closer to one, implying that there does not exist a long-run trade-off between wage inflation and unemployment. The situation is much the same when equation (1), i.e., the equation that directly follows from M and T's analytical framework, is freely estimated (Spinelli and Zis (1978)).

The conclusion we draw at this stage is that the empirical evidence does not lend any support to the analysis by M and T (1973). On the contrary, the results we have just presented lend further and unexpected support to the conclusion we have drawn at the end of the previous section, namely that there seems to be no long-run trade-off between wage inflation and unemployment.

3. The Cost-Push Hypothesis

The view that inflation is also to be associated with monopolistic pricing in the labour market is widely spread among Italian researchers. On such a view the economist alone cannot solve the problem of inflation; somebody else must help him explain the 'political residuals'. A moderate position in this model is associated with Ragazzi (1969) who maintains that the presence of a trade union makes the supply schedule infinitely elastic at low levels of employment without preventing the market from reaching a competitive solution under normal circumstances.[18] Dell'Aringa (1969) shares this view; according to him, however, the problem of wage determination falls between economics and industrial relations. Ferri (1970) takes this argument one step further by talking about

[18] This implies that trade unions played a major role during the 1950s rather than during the recent years.

'pushed wages' and by setting up a model that abstracts from market forces.[19] Sylos Labini (1967, 1972) points to the 'discretional component' of the process of wage determination; this view is also associated with the names of Modigliani and La Malfa (1967), Izzo *et al.* (1970), Valcamonici (1973), Ercolani (1976), Bianchi *et al.* (1976), and Tarantelli (1970, 1974, 1978).[20]

The faith in the cost-push hypothesis is shared by the government and the Bank of Italy[21] (and the O.E.C.D. (1970)) so that, not surprisingly, incomes policies are generally described as an effective anti-inflation weapon (Modigliani and La Malfa (1967), Izzo *et al.* (1970), Andreatta (1973), Ranci (1974), Crivellini and Vaciago (1976)).

In spite of their strong commitment to non-competitive models and solutions, nowhere do these economists specify a proper bargaining model in which claims, offers, expected gains and costs interact with one another. Indeed, most even ignore (Dell'Aringa (1969) and Ciravegna (1970) being the exceptions) that the demand side too is organized on a monopolistic basis.

Historically the cost-push hypothesis has been made operational and tested in three different ways. The first method is to use a dummy variable that is equal to one in 1963 (Tarantelli (1970)) or in 1962-63 and 1970 (Del Monte (1973)), or throughout the 1960's (Ferri (1970)); in Bianchi *et al.* (1976) we even have two different dummies; the former is equal to one in 1970 and in 1973 the latter over the post-1969 period.

The amount of ad hocery is no less dramatic when a strike variable is used and the rationale that has been given for particular choices is revealing. In his 1967 paper Sylos Labini disregards the

[19] The exact model this author has in mind is not easy to figure out. For at a certain stage he also says that trade unions simply transfer earnings (whose behavior is determined by market forces) into minimum wages.

[20] According to these authors the contemporaneous worsening of the problems of inflation and unemployment is easy to explain. Two different lines of argument are pursued though. On one side we have the Bank (1963) and Sylos Labini (1972) who stress the link between union militancy, lower profit, falling investment expenditure and the appearance of a deflationary gap. On the other Tarantelli (1974, 1978) and Vercelli (1977) consider stagflation to be the product of a deflationary policy which is deliberately pursued by the government and/or producers in an attempt to defeat the trade union movement. The notion that price inflation does not respond to demand conditions is clearly central to this analysis.

[21] See the *Relazione Previsionale* for 1968, 1970, 1972, 1974, 1976, 1977 and the *Relazione Generale* for 1963, 1970, 1973.

discretional component of the process of wage determination because he is unable to measure it; a few years later, however, (Sylos Labini (1972)) he writes "several indices of union militancy have been devised but to my knowledge nobody has yet tried to use the number of man hours lost owing to strikes. I did so and results were positive." A similar approach is found in Ferri (1970). Here union density changes are considered to be the proper proxy for trade unions' militancy; nonetheless, because of the lack of data, the time lost in strikes is chosen instead. For "the graph of the time lost is rather similar to that of minimum wages." According to Valcamonici (1973) the strike variable "expresses the impact of the institutional elements." No reason at all is given by Ferretti (1974) for his use of the time lost in strikes.

There are two further points we wish to make, the first of which is analytical. Work done by Fisher (1973), Purdy and Zis (1974), Spinelli (1976), Crouch and Pizzorno (1977) and Soskice (1977) point to the impossibility of mapping from strike variables to union militancy. In the context of these discussions fundamental questions have been ignored by the proponents of one version or another of the cost-push approach to the problem of inflation. Some economists have questioned the expected signs of the coefficients on the strike variable and the often ignored role of employers' resistance; others have questioned the relationship between strike volume and costs inflicted upon the firm. A final question relates the historical evolution of the targets and tactics of the trade union movement and to the choice of the proper strike variable.

The latter relates to the interpretation of the empirical evidence which has been put forward during all these years. Ferri (1970), Sylos Labini (1972), Del Monte (1973), Valcamonici (1973) and Ferretti (1974) all share the view that the evidence lends support to an eclectic type of approach to the problem of wage inflation. However, in his criticism of these studies Spinelli (1976) does show that "the significance of the strike variable entered with a lag and the improvement in the fit are to be associated with the 1970 observation and *with that alone*" [22] and concludes that trade union militancy does not seem to systematically affect the rate of wage inflation.

[22] Also see MODIGLIANI and TARANTELLI (1975) as well as FERRETTI (1974).

In a more recent study by the same author (Spinelli (1979)) the 1974, 1975 and 1976 observations are included and equations are estimated by 2SLS so as to cope with the simultaneity problem. Even when entered with a one year lag the four alternative strike variables behave very poorly and three of them even carry the negative sign. In this same study it is also shown that the results which have been put forward by Ward and Zis (1974), Laidler (1976) and Hibbs (1976) are meaningless. This is further evidence that strike activity does not seem to affect wage inflation in any significant and systematic way.

However before we draw any general conclusion we have to focus on the studies by M and T (1975, 1977) which, without making use of a strike variable, also implement and test the cost-push hypothesis.

3.1 *Modigliani and Tarantelli* (1975): *A First Step Towards the Cost-Push*

The first non competitive model is based on the analysis of the effects of the concentration of contract renewals. The average rate of change of wages is conceived of as a weighted average of three components:

— the fraction of workers subject to collective bargaining whose contract is renewed at time t (CC);

— the fraction of workers who are subject to collective bargaining but do not renew their contracts (CN);

— those workers who are not subject to collective bargaining (N), with of course, $CC+CN+N=I$. Now N tends to be a constant so we can write that $CC+CN=C=I-N=$ constant. The average rate of change of wages can be expressed:

$$\dot{w}=\dot{w}_{CC}\,CC+\dot{w}_{CN}\,CN+\dot{w}_{N}N, \tag{1}$$

The basic model is given by the equation

$$\dot{w}_i=a_i+B_i\,U'+D\dot{p} \qquad i=N, CN, CC \tag{2}$$

where $U'=\dfrac{1-\beta\left(\frac{UM-\gamma}{100}\right)}{U-\gamma-\beta\,(UM-\gamma)}$

Because of the presence of the escalator clause mechanism, "D" is likely to be the same in the three submarkets. The estimating equation is:

$$\dot{w} = a_0 + a_1 CC + b_0 U' + b_1 U'CC + \dot{p} \qquad (3)$$

where $a_0 = (a_N N + a_{CN} C)$ $\quad b_0 = (b_N N + b_{CN} C)$

$a_1 = (a_{CC} - a_{CN})$ $\quad b_1 = (b_{CC} - b_{CN})$.

We expect:

$a_0 > 0$ because of the long-run relation between wages and productivity changes;

$b_0 > 0$

$b_1 > 0$ because the elasticity of wages with respect to unemployment is likely to be higher for the fraction of workers who renew their contracts;

$a_1 \simeq 0$ because, *a priori*, a_{CC} does not appear to be different from a_{CN}.

The CC variable, measured by the percentage of workers subject to contract renewals, can be calculated from 1954 only. When M and T fit this model initially to the period 1954-1969 they lament the rather low number of degrees of freedom and use this as an explanation for their bad results. Seven more observations have become available since (1970-1976). The 1952 and 1953 observations are added as well for which we take a zero-CC value [23] (following M and T (1977)).

Estimation of the complete model yields the results which are given in Table 4, equation 4.1.[24]

The unemployment variable is not significantly different from zero, it carries the wrong sign and its β-value is clearly too low; the estimated b_1-coefficient is absurd; and the CC variable is not significant and with the wrong sign. Moreover the D.W.-value falls outside the permitted range.

While multicollinearity may be the cause of these results, we cannot treat it as the product of the case; it rather stems from

[23] Notice that, if anything, this procedure biases the results in favour of the cost-push hypothesis. This is because the 1950s have also been characterized by low rates of wage inflation.

[24] In these estimates, following M and T, we use the total rate of unemployment which implies a γ value of 1.5. See M and T (1973) on this point.

TABLE 4

Equation No.	a_0	a_1	b_0	b_1	D	γ	β	R^2	SEE	DW
4.1	1.047	−3.729	−.062	20.530	.846					
	(2.920)	(− .786)	(−.019)	(2.274)	(10.353)	[1.5]	[.1]	.91	1.98	1.31
4.2	3.390	—	1.025	12.844	.850					
	(3.924)		(.541)	(4.309)	(10.988)	[1.5]	[.2]	.91	1.96	1.33
4.3	3.707	—	—	13.920	.858					
	(5.925)			(6.535)	(11.540)	[1.5]	[.2]	.91	1.93	1.35

the very same structure of the model. So we either recognize that this cannot be appropriately estimated or we are bound to accept the results which turn out which cannot be judged as encouraging on any criterion.

Following M and T's *a priori* expectations of a zero a_1-coefficient we also fitted a model in which the CC variable does not appear. This exercise yields equation 4.2. Again the b_1-coefficient is implausible, and the unemployment variable is not significant and with a too low β-value. In addition, the DW confirms that the model is heavily misspecified.

As a final step, following M and T we also drop the unemployment variable.[25] Although we are no longer faced with a multicollinearity problem, the results (equation 4.3) do not differ in any relevant way from those we have seen so far. Once again the DW value is too low and both β and b_1 are simply not plausible. On the whole the model does not even improve upon the generalized Phillips curve.

The CC variable requires further discussion. Basically its role as a regressor could be rationalized in one of two ways. Although M and T do not say much about the nature of CC and about its role in the wage determination process one can consider this model as a first and fundamental step away from a competitive model and towards a cost-push type of approach. CC is therefore to be viewed as being, in some vague sense at least, a first proxy for union militancy. In this respect the analysis by M and T is not supported

[25] This amounts to supposing that in the original model b_0 is nil which implies the existence of a submarket with a perverse relationship between wage changes and excess demand as well as a situation where $\dot{w}$ is totally independent of market forces whenever CC equals zero.

by the empirical evidence. Furthermore, it also raises a serious analytical question as to how one can go from union militancy to wage inflation via CC.

Alternatively, the inclusion of CC could be justified on the basis of pure statistical considerations. To be explicit, we know that the aggregate rate of change of the wage index is a function of the percentage of workers who renew their contracts at any moment in time so that we can write: $\dot{w} = \Sigma_i \dot{w} N_i/N$. The CC variable is nothing but the ratio N_i/N. As Johnston and Timbrell (1974) have shown, if we take various groups of workers and we suppose that for institutional reasons the duration and periods of their contracts do not coincide (so that CC is not a constant) then even if the *annual* rate of wage change for the individual groups is the same, say 3 percent, the aggregate figure oscillates between a minimum value of .75 (when CC=.25) and a maximum of 7.50 (when CC=1.00). So, at first sight and particularly if we recall the fact that in the case of Italy contract renewals have always been heavily concentrated, there could be a reason that justifies the inclusion of CC among the regressors. However, offsetting forces are at work. First of all there are " locked-in " wage adjustments taking place in years subsequent to the year in which the contract is signed (Smith and Wilton (1978)) as well as plant agreements (these too are not captured by CC) which are usually reached in the interval between two national wage rounds but which nevertheless raise the aggregate wage level. In addition, much depends on the average period of time that has elapsed since the last national contract was signed (Johnston and Timbrell (1974)) and on the exact day (of the year if we use annual data) on which the new contract becomes effective. Finally, it is clear that the proper explanatory variable is given by the share of each group's wage in the total wage bill and not by the fraction that each group is in total employment (Ashenfelter and Pencavel (1975)).

The issue is an empirical one and in letting the data talk we have to be careful to choose the appropriate dependent variable; in this case, minimum wages and not earnings ought to be considered. Over the period 1954-1976 we have the following results:[26]

[26] The dependent variable here is given by the rate of change in minimum wages in the industrial sector. For CC has been calculated on an industry-wide basis. The inclusion of CC as an extra explanatory variable amounts to letting the intercept shift which represents a rather naive approach to the problem. One should let CC affect all aspects of the wage equation or define a new dependent variable, given by the ratio W/CC, and then use a standard set of regressors. Our choice simply reflects the desire to work with an equation which is as close as possible to M and T's.

$$\dot{w} = -3.667 + 1.061\ \dot{P} + 23.294\ U^{-1} + 5.856\ CC$$
$$(-1.359)\ (6.767) \qquad (2.174) \qquad (1.864)$$
$$R^2 = .81 \quad SEE = 3.58 \quad DW = 2.49$$

$$\dot{w} = -2.777 + 1.101\ \dot{P} + 21.206\ U^{-1} + 2.791\ CC$$
$$(-1.444)\ (7.847) \qquad (2.913) \qquad (.913)$$
$$+ 8.900\ D1970 \quad R^2 = .86 \quad SEE = 3.18 \quad DW = 3.04$$
$$(2.458)$$

The coefficient on CC is not robust in the first equation and collapses when a dummy for 1970 is included. The conclusion which follows from this is straightforward: the effects of plant bargaining *and* of the distribution within the unit time period of the actual dates on which the new contracts become effective must be much stronger than those which could be attributed to shifts in the percentage of workers who enter a new national contract. In summary all this implies that, even if the CC variable is considered to be a simple device which enables us to tackle an aggregation problem and not as a proxy for union militancy, it has no right to appear among the regressors in a wage equation.

3.2 *Modigliani and Tarantelli* (1977)

The basic hypothesis M and T start with is that " ... the percentage of workers subject to contract renewal whose contracts take effect on or before the expiration date of the previous contract is an increasing measure of the contractual strength of the trade union and that the percentage of workers whose contracts take effect after the expiration date of the previous contract is a measure of a weaker trade union. "

The labour force is then divided into four groups. The first is composed of those workers who are not covered by collective bargaining. They are denoted with W_N (the wage) and N (their weight). The second includes those workers covered by collective bargaining whose contract does not expire in the period under consideration. Their wage and weight are denoted with W_{CN} and CN. The third

includes those workers covered by collective bargaining whose contract renewal is not delayed. We denote with W_{CCM} and CCM their wage and weight. Lastly we have the workers who are covered by collective bargaining and whose contract renewal is delayed with respect to the expiration date of the previous contract. Their wage and weight is denoted by W_{CCR} and CCR respectively.

The aggregate rate of change of wages becomes:

$$\dot{W} = \dot{W}_N N + \dot{W}_{CN} CN + \dot{W}_{CCM} CCM + \dot{W}_{CCR} CCR$$

The basic wage equation is as follows:

$$\dot{W}_i = a_i + b_i U' + D\dot{p}_i \qquad i = N, CM, CCM, CCR$$

where U' is the generalized unemployment variable and " D " is taken to be the same for all groups.

After defining $C = CN + CC = CM + CCM + CCR$ the estimating equation becomes:

$$W = \alpha + y\, U' + \rho\, CCR + \eta\, CCM + v\, U'\, CCR + \lambda\, U'\, CCM + D\dot{p} \qquad [1]$$

where $\alpha = (a_N N + a_{CN} C)$ $y = (b_N N + b_{CN} C)$ $\rho = (a_{CCR} - a_{CN})$ $\eta = (a_{CCM} - a_{CM})$
$v = (b_{CCR} - b_{CN})$ $\lambda = (b_{CCM} - b_{CM})$

We should obtain:

$\lambda > 0$ because the wages of the group covered by collective bargaining whose contract is not renewed in the current period are expected to depend on unemployment to a lesser degree than the wages of the non unionized groups and the groups which recontracts without delays (b_{CCM}, b_N b_{CN});

$v < \lambda$ because of the greater contractual strength of the fraction of the market which recontracts without delay ($b_{CCM} > b_{CCR}$). We must not exclude *a priori* a nil or even a negative value for v;

η *positive and relatively high* in that the political constant of non-delayed contracts, a_{CCM}, ought to exceed a_{CN} which refers to an average of the delayed and non-delayed previous contracts;

$\rho < 0$ for opposite reasons and *relatively modest in value* as effect of essentially imitative phenomena;

$\gamma > 0$

$\alpha > 0$ because wages are expected to be strongly correlated to the expected rate of growth of labour productivity.

In collecting the data relative to the delayed and non-delayed contracts, M and T started from 1959 only because " ... up until the end of the 1950's only several of the categories of industry in fact renewed their contracts at periodic intervals... on account of the well known conditions of the labour market and of the locus and distribution of power in the industrial relations system in Italy." So, up to 1959, they choose a zero value for the variables relative to contract renewals. This procedure seems clearly inappropriate: the events of the 1950s and the particular distribution of power that characterized those years are all part of the data one has to consider.[27] M and T also drop those contracts which are renewed with a delay of more than 900 days. This seems arbitrary, and, so, unacceptable.[28]

The model was fitted to the period 1952-1976;[29] Table 5 gives a first set of results. From equation 5.1 we see that the whole model behaves very badly. Only the intercept, the cost of living and the CCM variables turn out to be significant. The three unemployment variables are totally insignificant and λ carries the wrong sign. CCR is also found to be non significant. Moreover, we expected a high estimated coefficient on U' and we have a value of 0.17, a positive coefficient on U'CCM and we have $-.90$. We should also get $v < \lambda$ and not $v > \lambda$. Finally the DW statistics denotes the presence of a problem of auto-correlated residuals.

M and T do not present any estimate of their own complete model over the period they were considering, namely 1952-1973.

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[27] Moreover if they want to stress that this was a period of massive unemployment and that, under these circumstances, it would be meaningless to look at the contract renewals side of the story, this would imply that they do admit there is a negative correlation between the push variable and the state of excess demand.

[28] Once again, our more appropriate way of handling the data should translate into results which are expected to be more favourable to the cost-push hypothesis. The delays dominate during the 1950s and also those contracts that are renewed with an extremely long delay are concentrated in the period up to 1960 with one minor exception in 1969.

[29] In order to generate the maximum number of degrees of freedom, following M and T, for 1952 and 1953 we have chosen a zero value for CCM and CCR.

TABLE 5

Equation No.	Constant (α)	$\dot{P}$ D	U' Y	U'CCR ν	U'CCM λ	CCR ρ	CCM η	β*	R^2	SEE²	DW
5.1	3.986 (4.860)	.856 (14.007)	.170 (.207)	2.798 (1.602)	− .905 (− .292)	− .921 (− .400)	12.161 (3.85)	.6	.95	1.551	1.45
5.2	4.114 (6.076)	.859 (14.570)	−.033 (−.079)	3.087 (2.198)		−1.105 (− .511)	11.364 (7.319)	.6	.953	1.513	1.44
5.3	3.291 (5.344)	.872 (13.643)	.814 (4.345)			1.783 (.952)	10.774 (6.454)	.6	.94	1.650	1.53
5.4	3.272 (5.802)	.857 (13.631)	1.379 (3.492)		−3.997 (−1.535)		14.284 (4.835)	.6	.945	1.597	1.51
5.5	3.083 (3.918)	.824 (11.454)	3.585 (2.511)		14.879 (5.081)			.2	.925	1.811	2.186
5.6	3.079 (5.107)	.854 (13.391)	2.008 (4.536)				10.111 (6.108)	.5	.94	1.65	1.69
5.6'	2.059 (2.344)	.860 (10.478)	3.177 (3.422)				6.655CC (3.687)	.4	.80	2.12	1.36

* This is the parameter which minimizes the SEE; it represents the relative weights of skilled and unskilled workers in the explanation of wage inflation.

They write " a direct test of [1] is unfortunately impossible because of the limited number of available degrees of freedom." We now have 18 degrees of freedom which means that one should not shift too much blame for the bad results to this problem.[30]

But, if M and T do not fit the whole model how do they test their own hypothesis? They proceed by successive approximation in an " ad hoc " fashion. First they drop the negatively signed and non-significant U'CCM. Equation 5.2 shows the results, which, except for the fact that now U'CCR is just significant, are unsatisfactory. The unemployment variable and CCR are non-significant and the former carries the wrong sign too. The DW statistics is also low.

Next, they drop the U'CCR variable; equation 5.3 gives this result. The unemployment variable is eventually significant but, although, as before we are no longer faced with a multi-collinearity problem, the percentage of workers who renew their contracts with a delay, CCR, turns out to be non-significant and with a positive sign. Again the DW statistics seems to suggest that the model is misspecifed.

They then drop the CCR variable and add U'CCM. From equation 5.4 we see that λ, which was expected to be positive, turns out to be negative and insignificant, and, besides, the DW-statistics is even lower. In the original paper equations 2, 3 and 4 appear in a footnote. The only results M and T include in the text correspond to our equations 5.5 and 5.6. In equation 5.5 the two unemployment variables are significant and correctly signed and, for the first time, the DW-statistics seems satisfactory. But the β value which minimizes the SEE is too low to be acceptable and the SEE itself higher than before. So M and T focus on equation 5.6 which soon becomes " the model ". They are pleased with this equation because when they compare its fit with that of a naive model in which CC instead of CCM appears among the regressors (see equation 5.6') they notice a remarkable fall in both the SEE and in the estimated coefficient on the cost of living variable (from 1.27 to 1.00 in their estimates). They are also pleased with the achievement of a lower coefficient on U' which is taken

[30] A further problem which is invoked by M&T in order to explain why they are not presenting the results is given by the multicollinearity among the regressors. But, as we have already said, the problem stems from the very structure of the model.

as a proof for the autonomous impact of trade unions on wage inflation. According to M and T these results show that their model is sensible and that the cost-push hypothesis stands up to the facts. That this evidence is far from convincing can be seen by paying attention to equations 5.1 through 5.5 and to the process of " natural selection "that drives these two authors towards equation 5.6; so after starting with four different markets and Phillips relations they wind up having a substantially equal Phillips curve within the whole unionized sector with an exception for the constant for the sector the new contract of which takes effect on or before the expiration date of the previous one.

But let's forget all this and suppose that, right from the beginning, M and T wanted to fit a model which makes $\dot{W}$ depend upon $\dot{p}$, U and union militancy as proxied by CCM (as equation 5.6 argues). Let us ask ourselves: what does CCM measure and is it a good proxy for union militancy?

From an analytical viewpoint there are two problems which we want to point to. To start, it is not clear why a *stronger* trade unions movement should necessarily imply a zero or a negative lag in a contract renewal. From the workers' point of view there certainly exists some sort of trade-off between the actual rate of wage changes and the date on which they become effective so that no correlation of all or even a negative one between $\dot{W}$ and CCM could be expected. After all, Tarantelli (1976) himself writes that the strength of the trade unions manifests itself in a demand for larger money wage increases, and no negative lags rather than for smaller money wage increases with a negative lag. Even if, in terms of wage bills, the total gain is the same, the former option is preferred by the rank and file.[31] Secondly, according to M and T the causation runs from CCM to wage inflation, but, at a certain stage they have to recognize that in periods of high inflation (we should say in periods of unanticipated inflation and/or of a widening gap between employers' and workers' expectations) in an attempt to defend real wages, workers create a lot of pressure and

[31] The actual historical record also provides some instructive examples. For instance it is well known that in the 1962-1963 wage round, in spite of the very low unemployment rate, the most important contract, that of the militant one-million metal workers, became effective only 117 days *after* the previous one had expired simply because the trade unions were trying to get something in terms of rights to plant bargaining.

demand a new contract before the previous one expires. This, of course, is a completely different story which sees causation going from $\dot{p}$ to CCM and which was emphasized a long time ago by Supino (1920). More recently Modigliani himself wrote " ... if the lag between price adjustment and wage adjustment is in itself a function of the rate of inflation it will decrease over time with trade unions insisting on shorter and shorter periods between successive wage adjustments " (Modigliani and La Malfa (1967)). Spinelli (1977), Crouch and Pizzorno (1977) and Gray (1976, 1978) have also made this argument.[22]

On an empirical ground too there are serious problems (on top of those we have already encountered in Table 5). Let X_1, X_2 and X_3 respectively stand for the number of workers who renew their contracts before, on, and after the expiration date of their previous contract. Let x_1, x_2 and x_3 be the ratio of this number to the total number of workers who are covered by collective bargaining (equal to 100 in our example). Let $\overline{X}$ indicate the sum of X_i ($i = 1,2,3$) and let us suppose that we had the following historical developments:

	X_1	X_2	X_3	$\overline{X}$	x_1	x_2	x_3	CCM	CCM'
t_1	10	0	0	10	.10	0	0	.10	.10
t_2	2	8	0	10	.02	.08	0	.10	.02
t_3	10	0	10	20	.10	0	.10	.10	0

The variable CCM suffers from two serious drawbacks. First of all it ignores the existence of a *symmetry* problem. Why should x_2 be added to x_1, in order to generate the proxy for union militancy? If a contract is renewed with a zero lag that can be taken as an indication that, at that particular moment in time, there is a perfect balance between employers' and trade unions' strength. Are the situations at time t_1 and t_2 the same? We do not think so. But there also exists a *standardization* aspect which should not be overlooked. Is it correct to ignore the percentage of workers who renew their contract with a delay? The level of union militancy experiment at t_1 must be different from that we have at t_3. In

[32] The seminal articles are to be found in JEVONS (1896), FISHER (1922), and FRIEDMAN (1974).

an attempt to cope with these two problems we are going to define a variable CCM', alternative to CCM, given by $x_1 - x_3$.

There is another and more serious aspect. The problem we are handling has an added dimension on the grounds that we should also pay the due attention to the *actual lenght of the positive or negative lag*. It is one thing to say that ten workers get a new contract one day (for example) before the previous one expires, it is another to say that the same workers get a new contract twelve months earlier. Therefore the following variables should be introduced (g_i indicates the actual number of days and X_2 has received two alternative weights, 0 and 1):

$$CCMW1 = X_1 \cdot g_1$$
$$CCMW2 = X_1 \cdot g_1 + X_2 \cdot 1$$
$$CCMW3 = X_1 \cdot g_1 - X_3 \cdot g_3$$
$$CCMW4 = X_1 \cdot g_1 + X_2 \cdot 1 - X_3 \cdot g_3.$$

Table 6 gives the result we obtain when we substitute our newly-defined variables for CCM. We see that nowhere is the proxy for union militancy significant. This takes us back to the conclusion we have drawn at the end of section 3.1. If anything, it can now be restated in even more general terms that union militancy, *however measured*, does not appear to be correlated with wage inflation.

There is one final major point. At the end of their paper, in an attempt to reconcile the generalized Phillips curve with the actual experience of a worsening trade-off, M and T (1977) raise the following question: has the Phillips curve shifted upwards since 1969? And is it now steeper than it used to be? In order to capture this possibility they re-specify the model in the following way:

$$\dot{w} = \alpha + y_1 A U' + y_2 B U' + \mu_1 ACCM + \mu_2 B CCM + D \dot{p}$$

where A is a unit vector up to 1969 and nil for the remaining years when the B vector takes on the unit value. The estimation of this equation yields:

[33] We are no longer faced with a problem of available degrees of freedom so that, in order to get a result as accurate as possible, we have dropped the 1952 and 1953 observations for which, as already said, there are no data on contract renewals. As a consequence for homogeneity purposes equations 5.6 and 5.6' have been re-estimated on the basis of the period 1954-1976.

TABLE 6

Equation No.	Constant	$\dot{p}$	U^1	β	CC	CCM	CCM[1]	CCMW1	CCMW2	CCMW3	CCMW4	R^2	SEE	DW
6.1	1.439 (1.357)	.843 (9.889)	4.505 (3.414)	.3	6.844 (3.610)							.90	2.17	1.35
6.2	3.572 (5.933)	.879 (13.401)	.833 (4.348)	.6		10.381 (6.135)						.94	1.69	1.52
6.3	3.074 (2.228)	.887 (8.133)	5.184 (3.071)	.3			1.270 (.423)					.83	2.80	2.09
6.4	2.872 (2.078)	.863 (7.845)	5.746 (2.413)	.2				.00000003 (.737)				.83	2.78	2.15
6.5	2.928 (2.138)	.862 (7.889)	5.554 (2.349)	.2					.00000004 (.915)			.83	2.76	2.17
6.6	3.460 (2.244)	.870 (7.830)	4.920 (2.846)	.3						.000000002 (.691)		.83	2.78	2.13
6.7	3.468 (2.251)	.870 (7.829)	4.916 (2.844)	.3							.000000003 (.701)	.83	2.78	2.13

$\alpha = 3.242$ $y_1 = 2.656$ $y_2 = 3.652$ $\mu_1 = 1.090$ $\mu_2 = 10.300$
(5.319) (5.351) (1.990) (.247) (5.495)
$D = .765$ $\beta = .5$ $R^2 = .954$ SEE = 1.535 DW = 1.458
(7.978)

It is exactly on the basis of this kind of results that they draw their fundamental conclusion: up to 1969 the generalized equation performed quite well; since then trade unions' pushfulness has made the economic system move onto a *higher* (μ_2 significant, μ_1 not significant) and *steeper* ($y_2 > y_1$) Phillips curve.

The concept of a higher Phillips curve rests entirely on the role of the CCM variable and what has been said so far undermines its value completely. As to the values of y_1 and y_2, it has not been shown there is any statistical difference between them. M and T fail to carry out such a test; they simply rely on the comparison of the absolute values of the two parameter estimates. Our results,[34] show that the null hypothesis cannot be rejected which totally undermines the statement made by the two authors and, at the same time, is in line with a vast literature (Dell'Aringa (1969), Ragazzi (1969), Ferri (1970), Valcamonici (1973) and Onofri (1976)) that associates the structural break in the relationship between wage inflation and unemployment with the end of the 1950's.

Conclusion

The debate on the existence of a long-run trade-off has been mooted to some extent by the new and more effective escalator clause mechanism introduced in 1977 which has effectively institutionalized a unit coefficient on the rate of inflation in all Phillips-type relationships. In spite of this, section 2 is still worth looking at for two distinct reasons.

First, the question remains whether in the past there has existed a long-run trade-off. If the answer is " No ", then the Italian post-war economic history has to be reinterpreted and in the process

[34] $S^2_{Y_1} = .246$, $S^2_{Y_1} = 3.369$, $\text{cov}(Y_1, Y_2) = .311$. This for the period 1954-1976. Over the period up to 1973 (which is relevant to the analysis by M and T) we have $Y_1 = 2.791$, $Y_2 = 5.037$, $S^2_{Y_1} = .270$, $S^2_{Y_1} = 3.958$, $\text{cov}(Y_1, Y_2) = 353$. Both sets of data do lead to a rejection of the null hypothesis.

some important questions arise. One such question (which is also terribly important from a policy viewpoint) relates to the determinants of the natural rate of unemployment at any moment in time. This requires, among other things, a thorough investigation of the effects of trade unions' activity on the structure of wages, labour force mobility and information disseminating processes. The extent to which unanticipated inflation translated into output fluctuations has also to be scrutinized if we want to tackle the problem of the optimum time path of monetary and fiscal policy.

Second, it is not just the wage equation that raises the homogeneity issue. What about the price equation or the demand for money for instance? There is no escalator clause mechanism here and yet the economist faces the same problem. Should he assume that economic agents fail to use information that is available to them? Our results seem to suggest that they do not.

As to the role of union militancy our feelings are best described by the following quotation from Leijonhufvud (1968), " The hypothesis tested seems all too often to be of the type. It seems reasonable to suppose that, by using variable x as an additional or substitute independent variable, a better regression result should be obtained. When the theoretical underpinnings are no more ambitious than that, there is almost no basis on which to compare results and new studies seldom knock old ones out of consideration." It may well be that unions do cause inflation; the evidence present to date does not support such a hypothesis. Instead, a new series of " ad hoc " variables and models have been introduced which do not overcome the analytical and empirical problems with former models. As a result they can not be cited as grounds for support for an incomes policy type of approach to the problem of inflation.

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