

STRUCTURAL CHANGES, UNEMPLOYMENT  
AND INFLATION IN ITALIAN INDUSTRY:  
AN EMPIRICAL ANALYSIS, 1950-1970

by

Roberto Valcamonici

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This paper is circulated for discussion purposes only and its contents considered preliminary.

choices' is its long term stability<sup>5</sup>. Furthermore, the introduction into the model of additional explanatory variables, other than the unemployment rate, did not help in improving the theoretical specification of the problem<sup>6</sup>. The purpose of this paper is then to investigate into the two denoted directions.

First, in order to discover the transmission mechanisms of inflation which are based on the labour market, we shall test the hypothesis widely discussed in the US literature, that the unemployment statistics do not reflect the true phenomenon<sup>7</sup>.

Second, analysing the impact of the remarkable structural modifications experienced by the Italian economy during the fifties on the Phillips curve and its stability, we shall verify the validity of the hypothesis that fast growing economies are able to absorb enormous changes in their structure without too many difficulties. In fact, this seems to be the central argument of the interesting generalisation of the Phillips curve for a developing country recently carried out by Modigliani and Tarantelli (20). The authors, following Holt's (12) analysis, have elaborated a model showing a 'permanent' downward shift to the left of the Phillips curve related to a developing economy with a continuous falling unemployment and heterogeneous labour force. In the authors' words it is the development process itself that, because of 'the resulting permanent

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5. On the theoretical ground it is worthwhile to remind the controversy, leading to Friedman (4) and Phelps (5), between 'unexpected' (the Phillips' one) and 'expected' inflation. As well-known, the 'price expectation approach' of the mentioned authors denies the long run validity of the trade-off curve which becomes a vertical line and loses its policy meaningfulness. See also Leijonhufund (6), Lucas and Rapping (7), Rees (8), Turnovsky (9), Brechling (10) and Solow (11).
  6. It is worthwhile pointing out here that within the last few years a new microeconomic theory of inflation and employment has been developed, where the emphasis is directed to the atomistic operation of the labour market, which operates under conditions of non-perfect information. For the most significant results, see the papers of Holt, Phelps, Mortensen and others in (12).
  7. See Mincer (13), Bowen and Finegan (14), Simler and Tella (15), Tella (16) Strand and Dernburg (17), Taylor (18), and for Italy La Malfa and Vinci (19).

improvement in the skill and competitiveness of the labour force,... reduces the inflationary pressure associated with any given level of employment'<sup>8</sup>.

From the results we shall advance some interpretations about the Italian economic reality. Such interpretations will lead us to take sides in the 'aggregative versus structural unemployment' controversy<sup>9</sup> and on the validity of the trade-off curve as menu for policy choices.

The research is in four sections. In section I the theoretical derivation of the Phillips curve is examined with special reference to the different types of unemployment and to the theoretical-empirical role of the excess demand. The main econometric results are shown in sections II and III, while in section IV the principal economic policy implications are discussed and some final conclusions drawn.

I. Types of unemployment, excess demand and the Phillips curve

As is well-known the theoretical basis of the Phillips curve, as it has been formulated first by Lipsey (2) and more recently by Hansen (29), is simply a labour market adjustment mechanism of Walrasian

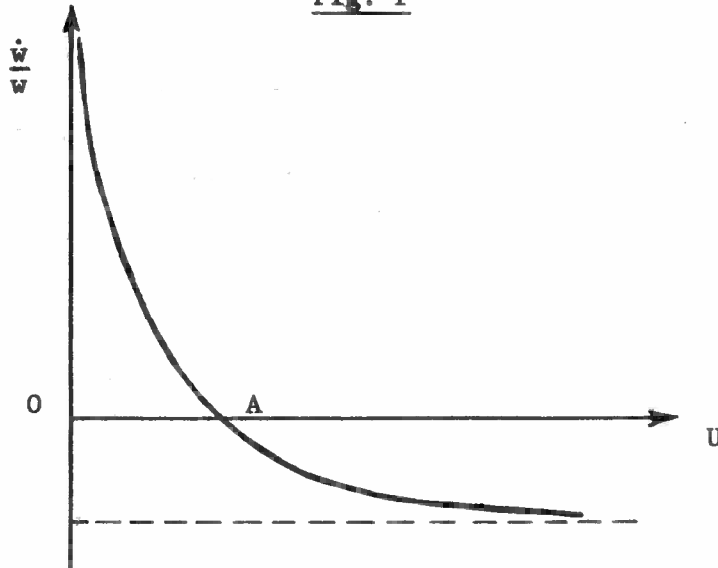
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8. Cf. Modigliani and Tarantelli (20), page 1.

9. See for instance Lipsey (21), Demsetz (22), Winder (23), Simler (24), Gilpatric (25), Stoikov (26), Thirlwall (27) and Reder (28).

type, expressed in terms of the usual D and S schedules.

Fig. 1



Thus, without need to illustrate entirely their analysis, the ideal Phillips curve of Fig. 1 is obtained in a competitive labour market dynamized hypothesising the money wage change  $(\dot{w}/w)_t$ , as a linear function of the proportional excess demand for labour measured by the ratio between  $(D-S)$  and the aggregate labour supply  $S$ . Analytically we have:

$$\left(\frac{\dot{w}}{w}\right)_t = \lambda \left(\frac{D-S}{S}\right)_t \quad \{I-1\}$$

and substituting for the various components of  $D$  and  $S$  of labour:

$$\left(\frac{\dot{w}}{w}\right)_t = \lambda \left(\frac{\text{VACANCIES} - \text{UNEMPLOYED}}{\text{EMPLOYEES} + \text{UNEMPLOYED}}\right)_t \cdot 100$$

$$\left(\frac{\dot{w}}{w}\right)_t = \lambda (V - U)_t \quad \{I-2\}$$

where  $\lambda$  is a positive parameter expressing the average adjustment speed of wage changes to excess demand, and  $V, U$  are the vacancy and unemployment rate respectively.

At this stage we think some specifications are necessary. First of all it is worth noting that the hypotheses underlying the traditional labour market theory, i.e. perfect competition, mobility, transparency (in the sense of perfect information) and wage flexibility, imply a wholly homogeneous labour force and to consider as 'voluntary' the eventual

unemployment registered at the equilibrium ( $D=S$ ). In fact, if the unemployed would accept work at the going wage rate ( $W_e$ ), they would be matched by the same amount of vacancies since  $V$  equals  $U$  at the equilibrium.

Whether or not this equality at the equilibrium is equal to zero is the crucial point of Hansen's analysis which allows him to derive the Phillips' curve within the theoretical framework of the market theory.

Implicit in the theoretical proposition that at the equilibrium  $V = U = 0$  is an instantaneous adjustment of the labour market where, as indicated in Fig. 2 and 3 (unbroken line), vacancies and unemployment are simultaneously inconsistent.

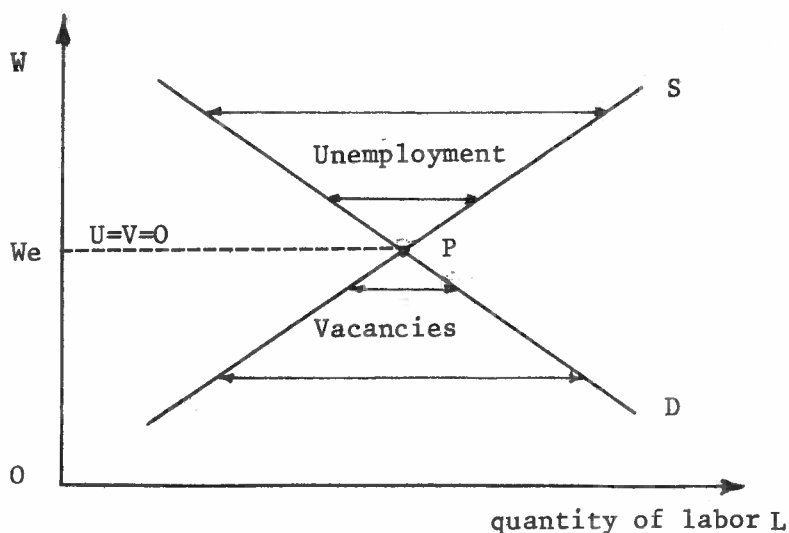


Fig. 2

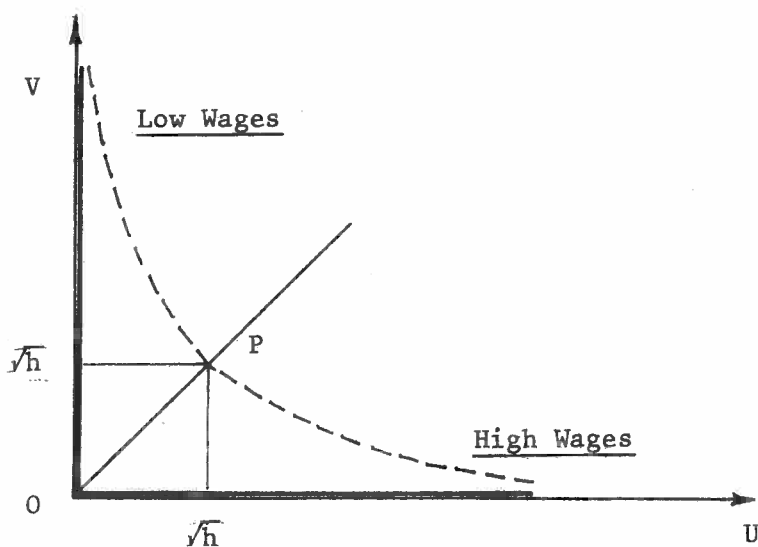


Fig. 3

Supposing instead that at the equilibrium  $V = U \neq 0$  we acknowledge that the perfect and instantaneous adjustment of the market is prevented by the existence of some frictions, such as the real heterogeneity of the labour force, the imperfect information and immobility in the market and, not last, the downward rigidity of the wage rate. So, on one side, unemployment and vacancies are simultaneously consistent and, on the other, the existence of a non-indeterminate relationship between  $V$  and  $U$  (fig. 3 dotted line) is established. As it is indicated in Fig. 4, such results follow supposing that at each wage rate level the real employed labour force lies on the  $EE'$  curve instead of on the broken line  $DPS$ , because of the existence in the market of the frictions mentioned above <sup>10</sup>.

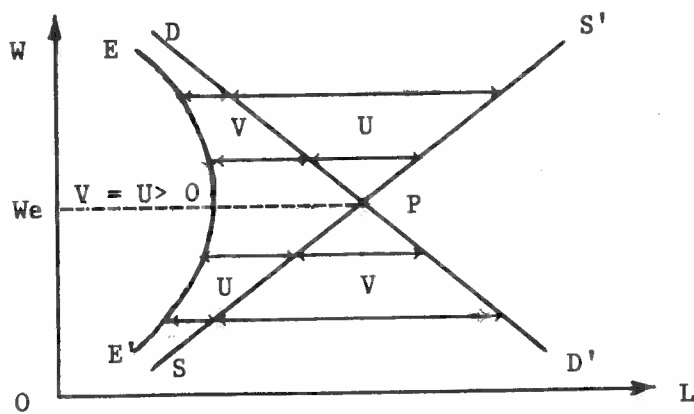


Fig. 4

The relevance of the non-indeterminate relationship between  $U$  and  $V$ , which as we have seen depends on the hypothesis that at the equilibrium  $V = U > 0$ , lies in the fact that it is all we need in order that relation {I-2} describes a Phillips curve of the type drawn in Fig. 1. If we substitute into the equation {I-2}:

$$V = h \frac{1}{U} \quad \text{\{I-3\}}$$

i.e. the analytical expression of the graphic relationship between  $V$  and  $U$  in Fig. 3, where  $h$  is the positive parameter which expresses the degree of imperfection in the labour market, we have:

$$\left(\frac{\dot{w}}{w}\right)_t = \lambda h \left(\frac{1}{U}\right)_t - \lambda U_t \quad \text{\{I-4\}}$$

Equation {I-4} is the mathematical expression of the relationship between  $\dot{w}/w$  and  $U$  drawn in Fig. 1, where the eventual greater linearity for larger values of unemployment is attributable to  $(-\lambda U_t)$ .

10. See Hansen (29), page 7.

Having derived the Phillips' curve, let us now fix our attention on the elements which determine its slope and position in the cartesian space and on some assumptions, implicit in its formulation, which will help us to handle the statistical problem concerning the best proxy for excess demand.

In general terms, with regard to the first point, we can say that the slope and position of every estimated Phillips curve are determined by the structural elements peculiar to the real economy to which that relationship refers. Among them we can consider the base resources, the extent to which technical progress is absorbed by the economy<sup>11</sup>, expectations in the market, the existence of some institutional arrangements and, for the Italian economy, so widely dependent on exports, the state of external demand<sup>12</sup>.

In our analysis, carried out in terms of D and S, there is theoretically no room for explanatory variables other than excess demand in the determination of money wage changes. This just means the only impact the above structural elements have is on the slope and position of the curve in Fig.1. Then we can write the relation {I-4} as :

$$\left(\frac{\dot{w}}{w}\right)_t = \lambda h\left(\frac{1}{U}\right)_t - \lambda U_t + \bar{w}_t \quad \text{\{I-5\}}$$

where  $\bar{w}_t$  stands for the eventual "spontaneous" wages increases, i.e independent of excess demand.<sup>13</sup>

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11. It is clear that, other things being fixed, the extent to which technical progress is embodied in new investments determines the growth rate of productivity. And this contributes to the establishment of the margin available for wage increases without engendering necessarily new inflationary pressures. For a theoretical analysis of how the various types of technical progress affect productivity, see Valcamonici (30).
  12. Cf. Bodkin and al.(31), page 23.
  13. In a way we are supposing the trade unions can act independently of the tightness of the labor market. For a very interesting work in this direction, see Hines(32).



More precisely, in interpreting the empirical results which will follow, we shall look at the asymptotes of the estimated Phillips curve as the outcome of the operation of a certain structural situation. The horizontal asymptote will stress the existence of some institutional elements such as escalator clauses and collective bargaining, while a vertical one different from the ordinate will detect a certain amount of structural unemployment<sup>14</sup>.

So we have led the discussion on the last point we wanted to deal with in this section, i.e. the problem of defining unemployment. Its importance is quite obvious because of the relevance the concept of unemployment has in the choice of economic policy goals and the appropriate tools capable of achieving them<sup>15</sup>. Furthermore a suitable definition of employment is imperative for its statistical measurement and consequently for the "goodness" of that measure as a proxy for excess demand. In fact it is clear that though the best theoretical proxy for excess demand is obtained by using contemporaneously vacancies and unemployment data (see equation {I-2})<sup>16</sup>; in practice this is impossible in countries such as Italy with no precise statistical information on unfilled vacancies.

If employing only U data is theoretically justified by the relation {I-4}, it is however necessary to point out that, in order to derive it, we implicitly assumed a given aggregate labour supply and a constant relationship between V and U. Referring to Fig. 4, this means that  $EE'$  must be sufficiently stable over time in respect to DPS. That these are rather strong assumptions has been shown by several recent studies in the field of the labour force variability in the business cycle<sup>17</sup>.

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14. Since in Fig. 1 unemployment  $\bar{OA}$  is all frictional, the vertical asymptote coincides with the ordinate.

15. See Gobbato (33), page 41 and Cagliani (34), page 2.

16. An index using both U and V has been applied for instance by Dicks-Mireaux and Dow (35).

17. See the papers mentioned in footnote 7.

The above considerations indicate that U statistics used as an indicator of the pressure of demand for labour in the market have some deficiencies which can sometimes be decisive. This point, however, will be better developed in Section III where the econometric analysis will be addressed to establish how much additional explanatory power, in determining money wage changes, has to be attributed to the just mentioned corrective components of unemployment.

The practical difficulties we find in handling unemployment are a clear indication of the major conceptual difficulties in satisfactorily distinguishing among various types of unemployment. Examining the literature on the subject<sup>18</sup> it is evident that while, on one side, conflicting definitions are used for the same type of unemployment, on the other, different concepts are often used as synonymous. In the literature, however, the usual way to classify unemployment is either on the ground of the causes supposed directly responsible or on the "cures" which can be implemented in order to remove it. As far as our analysis is concerned, since both types of definition are relevant and do not necessarily lead to the same result in terms of relative importance among the various types of unemployment, we will adopt a hybrid definition which diagnoses the causes as a basis for remedial action. Then we define the following three basis types of unemployment:

- (i) Frictional unemployment, essentially short period, specifically unemployment associated with the normal labour turnover motivated by the desire for a better paid and/or more suitable job. Since theoretically frictional unemployment is independent of the level of aggregate demand, it is entirely consistent with full employment of labour and on the economic policy side eliminating it is not worth while.
- (ii) Cyclical unemployment, due to a deficient effective demand, which can be removed by stimulating economic activity by means of monetary and fiscal policies but without creating unacceptable rates of inflation.

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18. See the papers from (21) to (28) and Bergman (36) as part of the large literature on the structural-demand deficient unemployment debate.

(iii) Structural unemployment, essentially long period, for example unemployment which can more likely be explained in terms of the heterogeneity of the labour force and the structural shifts (affecting the composition of labour-skill requirements), to which every real economy is subjected. In order to avoid a continuing inflation we need here some selective rather than aggregate policies, namely those directly affecting the sectors concerned with the labour force<sup>19</sup>.

II. The Italian Phillips curve and its long term stability: some empirical results

The Phillips curve itself is just an empirical relation drawn to fit a scatter diagram of wage changes on unemployment rates for a series of years. Such a scatter diagram is represented by Fig. 5, in which the yearly percentage changes of the minimum contractual wage rates for workers in Italian industry are plotted against the annual average percentage of non-agricultural unemployment over the period 1950-70<sup>20</sup>.

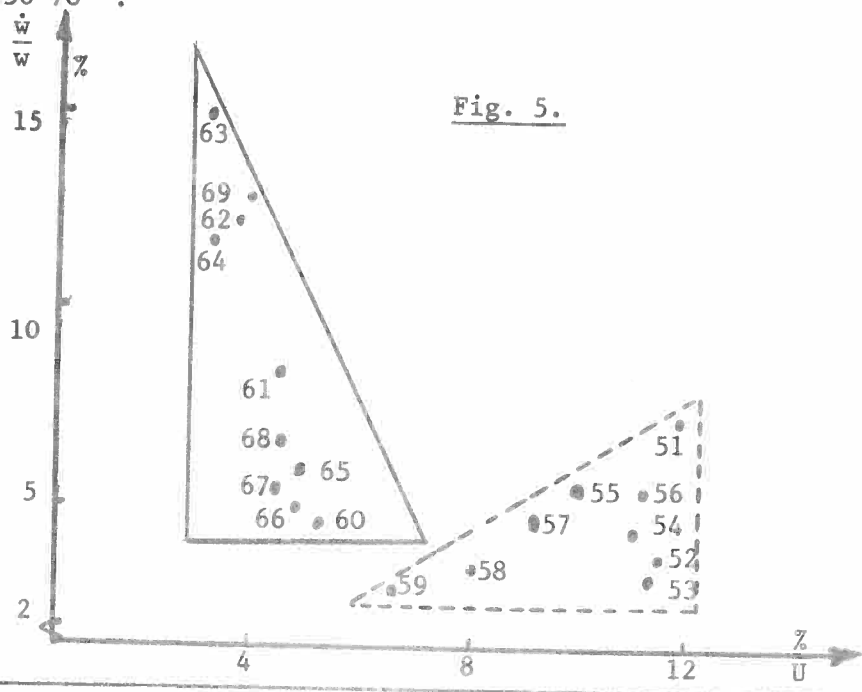


Fig. 5.

19. It is essential to point out that these adopted unemployment definitions involve two distinct limitations: (a) subjectivity (b) lack of clear separation among the various concepts. As far as 'subjectivity' is concerned it is quite clear that an 'acceptable' level of inflation is only definable on the basis of some policy makers' personal preferences.

20. The fact that the points related to the first and last year of the period considered do not appear in Fig.5, depends on the definitions of  $\dot{w}/w$  adopted.

A first look at the scatter reveals a systematic grouping of the observations in two distinct areas which seems to tell two different stories. Considering the observations from the first half period (those contained within the dashed lines of Fig. 5), it seems in fact possible to deduce that the functioning of the labour market, in terms of the wage dynamics, is not consistent with the theoretical arguments previously discussed. It is only in the second subperiod as it is easily seen from the observations contained within the unbroken lines, that wage rates do tend to rise when the labour market is tight, and the tighter the faster<sup>21</sup>.

But what interests us more is the conclusion that this "visual" analysis seems to suggest, i.e. that the relation in the two subperiods is not the same.

This hypothesis should not be too far from reality if we think of the profound structural changes experienced by the Italian economy over the period under consideration. In order to take some concrete examples it is only after 1959 that unemployment assumes values comparable to those characteristic of mature economies. And furthermore, this finds its more likely explanation in the reorganisation of the production processes and in overcoming the technological gap<sup>22</sup>, which occurred in the 50's and which was facilitated by a fast growing external demand and a larger degree of economic integration between markets<sup>23</sup>.

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21. Notice that the peculiarities of the two sub-periods are clearly indicated in Fig. 5 by the position of the two triangles which face each other.
  22. This is in Vacziago's (39) view one of the main 'causal factors' of the Italian postwar economic growth. The author maintains that, in a period of technological gap to be bridged, the rapid increase in the external demand modified the export structure on behalf of the 'modern sectors' and quickly allowed to embody more advanced technologies. See also Valli (40) and footnote 11.
  23. Note that the principal agreements in terms of commercial and tariff policies of the postwar period, i.e. C.E.C.A. and EEC, have been ratified by Italy in the first sub-period which we have considered. C.E.C.A. was ratified on 18-4-1951 and enforced on 25-7-1952; E.E.C. on 25-3-1957. Cf. Pedone (41), page 258-59.

Finally, according to what has been said in the previous section, it is not to be undervalued that, on the institutional side, the shift to the centre-left and the greater trade union incisivity of the second period contribute to the scarce homogeneity of the two sub-periods<sup>24</sup>.

If the structural modifications mentioned above were really responsible for the different wage fixing of the two sub-periods, it is quite clear that applying the same model to the period as a whole is not theoretically justified. The framework of our analysis is then in terms of verifying the long term stability of the relation between  $\dot{w}/w$  and  $U$ . In order to attempt such a verification and at the same time to check if the permanent shift of that relation allows a clear improvement in the trade-off between inflation and unemployment, we estimated the wage equation over the period 1950-70 as well as the subperiods 1950-59 and 1960-70.

There is no doubt that in principle the decision of cutting our historical period at 1959-60 involves some arbitrary elements. It is in fact hard to maintain that structural changes display their influences at a particular point in time rather than gradually. However, it seems sensible to think that the interpretation of the results will not be misleading if the application of a statistical test, such as the Chow (45) test<sup>25</sup>, will lead us to reject the null hypothesis of the equality between the two sets of observations.

Let us now concentrate on the statistical specification of the theoretical equation {I-5}. Since, according to our equation {I-5} the general shape of the Phillips curve is that of being convex to the origin and since an unambiguous choice of the functional form is not provided by the theory, we shall adopt the following basic relation:

$$\left(\frac{\dot{w}}{w}\right)_t = a_0 + a_1 \left(\frac{1}{U}\right)_t + a_2 \left(\frac{\dot{P}}{P}\right)_t + a_3 (HS)_t + u_t \quad \text{\{II-1\}}$$

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24. For an interesting analysis of the historical-political type on the permissive institutional conditions concerning a certain wage dynamics in Italy, see Edelman-Fleming (42).

25. For a discussion of this test see, for instance, Johnston (46), page 136-38 and Fisher (47).

According to the theoretical interpretation given to equation {I-5},  $(1/U)_t$ , the reciprocal of the non-agricultural unemployment rate, stands for the operation of labor market forces, while the cost of living changes  $(\dot{P}/P)_t$  and the total number of hours lost in strikes  $(HS)_t$  express the impact of the institutional elements, as  $\bar{W}_t$  in equation {I-5} does.

In Table II-1 we have reported, for each relative period, the results obtained applying OLS to equation {II-1}<sup>26</sup>.

The next step is to verify, by applying the Chow test to the regression equations of Table II-1, whether or not the two sets of observations singled out in the scatter of Fig.5 come from the same sample. As well-known the Chow test is a F test expressed by the relation :

$$F_{\text{obs}} = \frac{Q_1 - Q_2 - Q_3 / k}{Q_2 + Q_3 / n - 2k}$$

where  $Q_1$ ,  $Q_2$  and  $Q_3$  are the sums of squared residuals over the period 1950-70, 1950-59 and 1960-70 respectively, while  $n$  and  $k$  are the total number of observations and parameters respectively to be estimated. In our case<sup>27</sup> the

26. Notice that in none of the three equations we found the multicollinearity between  $(HS)_t$  and  $(1/U)_t$  complained of by Sylos Labini (37 b). The highest partial correlation coefficient is 0.57, which reduces to 0.48 if instead of  $(HS)_t$  we use the average hours lost in strikes for worker.

In this context we wish to remark that the procedure adopted by Sylos Labini in order to overcome multicollinearity, i.e substituting the residuals obtained regressing  $(HS)_t$  on  $(1/U)_t$  for  $(HS)_t$ , seems rather hasty.

In any case, since it leads to an underestimate of the coefficient of  $(1/U)_t$ , a better specification is needed. In fact, if in the {II-1} we substitute the residuals  $\hat{e} = (HS)_t - \hat{b}_0 - \hat{b}_1(1/U)_t$  for  $(HS)_t$ , we have :

$$\begin{aligned} (\dot{w}/w)_t &= \hat{a}_0 + \hat{a}_1(1/U)_t + \hat{a}_2(\dot{P}/P)_t + \hat{a}_3\{(HS)_t - \hat{b}_0 - \hat{b}_1(1/U)_t\} \\ &= \{\hat{a}_0 - \hat{a}_3\hat{b}_0\} + \{\hat{a}_1 - \hat{a}_3\hat{b}_1\}(1/U)_t + \hat{a}_2(\dot{P}/P)_t + \hat{a}_3(HS)_t \\ &= \hat{g}_0 + \hat{g}_1(1/U)_t + \hat{a}_2(\dot{P}/P)_t + \hat{a}_3(HS)_t \end{aligned}$$

where it should be pointed out that the estimates of the constant and of the coefficient of  $(1/U)_t$  in the {II-1} are modified. More precisely, while  $\hat{g}_0$  can take values  $\hat{a}_0 - \hat{a}_3\hat{b}_0$  (depending on the sign and the possible value of  $\hat{a}_3$  and  $\hat{b}_0$ ),  $\hat{g}_1$  will be surely  $< \hat{a}_1$ , given that both  $\hat{a}_3$  and  $\hat{b}_1$  are positive.

27. Notice that,  $Q_1=13.9876$ ,  $Q_2=1.6226$ ,  $Q_3=3.5599$ .  $k=4$  and  $n=19$ .

Table II-1

The Phillips curves for the subperiods and the period as a whole

Estimation method : Ordinary Least Squares (OLS)

PERIOD OF ESTIMATION STATISTICS	1950 - 70	1950 - 59	1960 - 70
$\bar{R}^2$	92.69	77.34	95.93
DW	1.53	0.778	2.22
F	81	11	80
<u>Variables</u>			
CONSTANT	- 1.890 (- 3.076)	1.124 (0.715)	- 8.862 (- 4.286)
$(\frac{1}{U})_t$	16.393 (4.718)	3.056 (0.206)	48.672 (4.668)
$(\frac{\dot{P}}{P})_t$	1.100 (8.391)	0.770 (5.105)	0.707 (3.313)
$(HS)_t$	0.0187 (4.45)	0.0089 (0.431)	0.021 (6.035)

Notes :

(1) Definition of variables :

- a. Dependent variable  $(\dot{w}/w)_t$  : annual percent changes in the minimum contractual wage rates in industry.
- b. Non-agricultural unemployment rate  $U_t = \frac{\text{Non-Agr.LF} - \text{Non-Agr.Empl.}}{\text{Non-Agr. LF}} \cdot 100$
- c.  $(\frac{\dot{P}}{P})_t$  : annual percent changes in cost of living index.
- d.  $(HS)_t$  : total number of hours lost in strikes.
- e. All rates of changes are defined as follows:  $(\frac{\dot{X}}{X})_t = \frac{X_{t+1} - X_{t-1}}{2 X_t} \cdot 100$

- (2) The estimated t ratios are given in parentheses below the estimated regression coefficients.

value of the observed F statistics turns out to be greater than the tabulated statistics for the corresponding degrees of freedom, i.e.  $F_{obs} = 4,67$  and  $F_{4,11} = 3.36$ . Then, the null hypothesis that the same relationship {II-1} characterized both sets of data under consideration has to be rejected. Consequently the two subperiods have to be considered separately. In fact, as far as the wage dynamics of the two sub-periods is concerned, a significantly different economic reality clearly emerges from the regression equations reported in Table II-1.

The hypothesis expressed by equation {II-1} namely that money wage rates actually set in the short run are the outcome not only of the level of aggregate demand and the accompanying rate of U but also of important institutional factors, is well fitting the second period economic reality, in fact 95% of the variation in  $(\dot{w}/w)_t$  is explained. The same thing cannot be certainly stated for the first period. The coefficient of  $(\dot{P}/P)_t$  is the only statistically significant parameter and a DW statistics of 0.778 strongly suggests that the model has been mis-specified. Furthermore, it is worth noticing the large difference in magnitude between the estimated coefficients of  $(1/U)_t$  and  $(HS)_t$  in the two sub-periods. This supports the conclusion that the impact of both the market forces and the institutional factors has been substantially different over the historical period considered.

Two features of the estimated coefficient of the cost of living changes variable deserve special emphasis. First, its marked stability over the two sub-periods reflects the automatic operation of escalator clauses. This may be interpreted as an indirect proof that our analysis is correct. In fact, where no special hypotheses are made, one of the common features of all the estimates made in Italy over the whole period is that one of a price changes coefficient greater than unity<sup>28</sup>. Second, its value of 0.7 - 0.8 indicates that escalator clauses operation does not amount to a complete compensation.

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28. See for instance our results in Table II-1 and also those of Sylos Labini (37), Ragazzi (44), Dell'Aringa (43) and Tarantelli (38).



For an immediate analysis of the difference between the two sub-periods and the error that is made considering the historical period 1950-70 as homogeneous, in Fig. 6 we have drawn the relationships relating to each of the three equations in Table II-1. We have defined these relationships as "steady-state" since they have been calculated for the mean values of both  $(\dot{P}/P)_t$  and  $(HS)_t$  in the relative periods<sup>29</sup>. Notice that the marked lines in Fig. 6 are the relevant ones since they refer to the range of unemployment actually experienced by the economy in each period. This also suggests that there is little need to speculate about a "necessary" level of unemployment which must be experienced if prices are to be kept stable.

The almost perfect linearity of the 1950-59 relationship within its relevant range suggests that the wage dynamics was "administered" and therefore independent of the labour market forces. The level of the curve, the horizontal asymptote following the adopted terminology, is the expression of the only relevant institutional factor of the period<sup>30</sup>, namely escalator clauses which express the institutional "wage-price" link.

The equally evident non-linearity and steepness of the 1960-70 relationship, especially for low levels of U, offers indirect support to the structuralist hypothesis, suggesting that structural unemployment (the vertical asymptote located at about 2% of the total U<sup>31</sup>) does comprise an important component of total U. Furthermore, the higher level of the 1960-70 Phillips curve expresses the greater impact of the institutional elements

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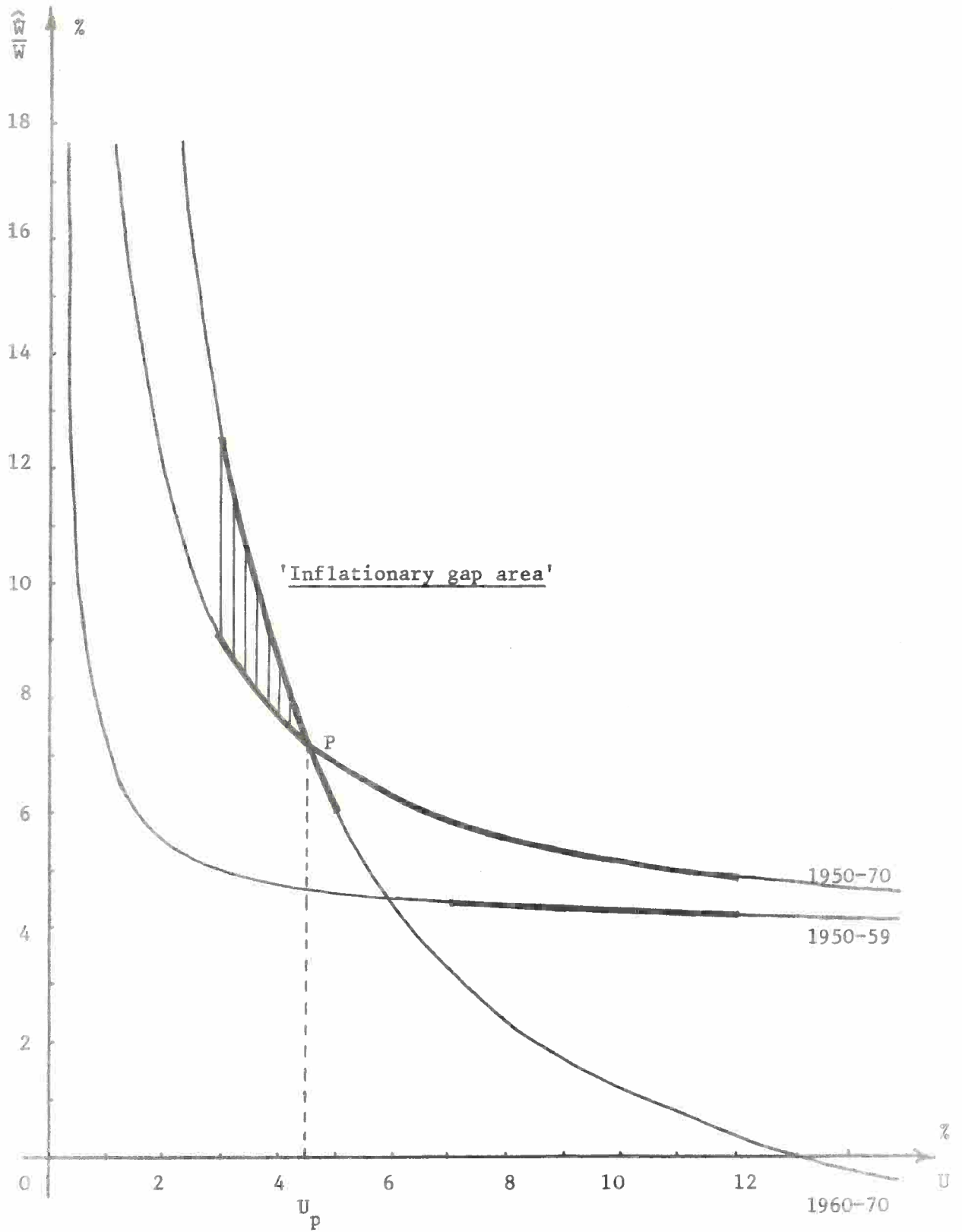
29.	For each period the mean values of $(\dot{P}/P)$ and $(HS)_t$ are :
1950-70	$\dot{P}/P = 3.58 \%$ $HS = 78.722$ millions of hours
1950-59	" = 3.19 %                              " = 41.768                      "                      "
1960-70	" = 3.93 %                              " = 111.980                      "                      "

30. It is in fact to be noted that for the period 1950-59, in terms of explained variance, better results are obtained if  $(HS)_t$  is dropped. See equation No. 7 in Table II-2 ahead.

31. As indirect evidence it is interesting to note that, from data relating to the duration of unemployment in extra-agricultural activities in the period 1960-70, we have estimated that approximately 1.5% of the non-agricultural labour force remains unemployed for more than six months.

Fig. 6

Steady-state Phillips Curves



in that period. The very good statistical performance of  $(HS)_t$  besides the "wage-price" link suggests also the existence of further links of the type "wage - wage" and "wage-profit". It seems to us in fact that the great importance of the unions behaviour is to introduce a certain rigidity in the wages structure. If, on one side, high and rising profits are inevitably the basis of high wage claims (wage-profit link), it is also true that wage increases for one occupation often spill over into the related occupations (wage-wage link) in order to maintain the conventionally established differentials<sup>32</sup>.

However the most important implication following from the previous analysis is that, assuming the homogeneity of the historical period 1950-70, the inflationary pressures actually experienced by the Italian economy in the second subperiod may be underestimated. This is quite clear from Fig. 6 in which, for levels of  $U$  less than  $U_p = 4.45\%$ , is localized an "inflationary gap area".  $U_p$  is the level of unemployment which corresponds to the intersection  $P$  between the 1950-70 and 1960-70 Phillips curves. We shall refer to  $P$  as the "Structural Break Point", admittedly with a certain degree of subjectivity. This seems to be sufficiently in line with the given definition of structural unemployment. In fact, beginning from  $P$ , it is likely that unacceptable rates of inflation would be generated if, in order to alleviate unemployment, aggregative policies are used.

From the above arguments it follows that the result of Modigliani and Tarantelli (20), i.e a permanent downward shift to the left of the Phillips curve with the consequent reduction of the inflationary pressure for any given level of  $U$ <sup>33</sup>, is not confirmed by our analysis. Actually our find-

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32. It is worth pointing out here that the interrelations among wages, prices and trade unions activity suggest the need of a simultaneous determination of these links. But this is clearly a subject for a separate paper.

33. Such a result is inferred on the basis of a generalisation of the Phillips curve for a developing country, whose main feature is the heterogeneity of the labor force. In order to sketch their analysis, of particular interest is the hypothesis that  $(\dot{w}/w)_t$  is affected both by the level of unemployment  $U$  and its composition (as between trained and untrained). The latter because the probability of filling a vacancy will

ing, graphically summarized in Fig. 6, leaves the door opened to opposite conclusions. Eventually it is more likely to experience a worsening than an improvement in the trade-off. And this is explained by the fact that while the Phillips curve shifts to the left at the same time it becomes steeper.

The process underlying our analysis is dominated by two phenomena both at work. On one side, falling unemployment and the accompanying permanent improvement in the skill and competitiveness of the labor force and, on the other, changing structure of the economy.

Since the results of Modigliani and Tarantelli are obtained relying solely on the first phenomenon it is clear that their analysis must be subjected to the important qualification that the structure of the economy does not change. And the more we refer to fast developing economies the more that assumption appears to be rather strong and restrictive<sup>34</sup>.

increase with the size of the pool of trained unemployed. After mathematical manipulation the suggested regression equation takes the form :

$$\left(\frac{\dot{w}}{w}\right)_t = a + b \frac{1 - c(U_{min,t} - U_{frictional})}{U_t - U_{frictional} - c(U_{min,t} - U_{frictional})} + d\left(\frac{\dot{P}}{P}\right)_t$$

where  $U_{min,t}$ , the minimum level of  $U$  reached before  $t$ , is a proxy for the composition of  $U$ . The originality of this formulation is the introduction, through the variable  $U_{min}$ , of a shifting vertical asymptote. The standard Phillips curve is, in this way, dynamized. For a developing economy, with  $U_{min}$  diminishing over time, this means that instead of a unique Phillips curve, a whole "parametric" family of short run curves is obtained, one for each value of  $U_{min}$ . The "envelope" of such a family of short run curves (labelled by the authors, 'Development Locus' DL) is approximately that obtained by fitting the standard Phillips equation (in our case equat. { II-1 } ) to the data relating to a developing economy. Basically it is the 'DL' curve which, in the process of development shifts to the left and downwards. See Modigliani and Tarantelli (20).

34. So far our analysis has been in terms of  $(\dot{w}/w)$ . However, as already stated in footnote 4, in order for us to be able to make the transition from the Phillips to the trade-off curve, it is necessary to establish a relation between  $(\dot{w}/w)_t$  and  $(\dot{P}/P)_t$ . An usual theoretical hypothesis, supposing a mark-up factor approximately constant, is that  $(\dot{P}/P)_t = (\dot{w}/w)_t - (\dot{A}/A)_t$ . In this case, assuming that labor productivity  $A$  rises by  $X\%$  per year, the trade-off curve is simply obtained by a downward shift of the Phillips curve by that  $X\%$ . From the statistical point of view instead, the trade-off curve may be derived estimating, for instance, both regressions of  $\dot{w}/w$  and  $\dot{P}/P$  and then substituting the former into the latter.

Before concluding this section it is worth spending a few words on some more general results.

Table II-2 shows some regressions that we thought useful to report, either because they give an idea of the contribution of single variables in explaining wage changes, or because they present the different results that are obtained when, for instance, the total unemployment rate  $(U^*)_t$  instead of the non-agricultural  $U_t$  and the change in unemployment lagged or not are used.

According to Table II-2, slightly better results, in terms of  $\bar{R}^2$ , are obtained using the non-agricultural unemployment rather than  $(U^*)_t$ . Furthermore, while in Phillips' original study the change in unemployment as an expectations variable, figured prominently, in our case,  $(\dot{U}/U)_t$  and  $(\dot{U}/U)_{t-\frac{1}{2}}$  are never statistically significant and also often have the wrong sign.

Finally, comparing the results in Table II-1 with those in Table II-2 for the same period of estimation, the substantial improvement in overall fit and DW statistics obtained by introducing  $(HS)_t$ , the variable associated with trade unions behaviour, is to be noted.

We may briefly discuss another feature of our analysis. The position and slope of the Phillips' curves in Fig. 6 enable an analysis of the nature of the "cost push" versus "demand pull" controversy. A controversy which finds its real relevance in terms of policy. In fact, comparing Fig. 6 with Fig. 7, which synthesises the well-known extreme theoretical positions of the two schools<sup>35</sup>, certain similarities clearly appear. These tempt a "strict" interpretation of the kind of inflation experienced in each period. Thus, in line with the results obtained, it is an inflation of the "cost push" type which is diagrammatically well established for the first period. For the second period, fully conscious that it is virtually impossible in this matter to provide too rigid separations, it is an inflation à la Schultze (48)

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35 See Bodkin and al. (31), page 24-26.

Table II-2

Contribution of single variables in explaining wage changes

Estimation method : ordinary least squares (OLS)

No. Statistics	1	2	3	4	5	6	7	8	9	10	11
$\bar{R}^2$	52.11	51.41	55.52	55.89	84.10	83.25	80.42	75.37	71.57	71.31	93.90
DW	0.97	0.97	0.96	0.94	1.08	1.06	0.97	1.00	1.04	1.01	1.98
F	22	22	12	13	51	48	20	17	10	10	70
Variables											
Constant	0.416 (0.29)	-0.028 (-0.02)	-0.248 (-0.15)	-0.427 (-0.28)	-2.053 (-2.26)	-2.348 (-2.42)	1.142 (0.78)	-6.448 (-1.29)	-7.577 (-1.08)	-6.555 (-1.19)	-1.592 (-2.58)
$(\frac{1}{U})_t$	33.62 (4.76)		36.47 (4.91)	36.70 (5.06)	24.60 (5.66)		6.75 (0.60)	43.66 (1.70)	49.45 (1.38)	44.34 (1.55)	12.89 (3.48)
$(\frac{1}{U^*})_t$		29.02 (4.70)				21.09 (5.44)					
$(\frac{\dot{U}}{U})_t$			0.0093 (0.18)						-0.015 (-0.25)		0.021 (1.11)
$(\frac{\dot{U}}{U})_{t-1}$				-0.016 (-0.399)						-0.0041 (-0.097)	
$(\frac{P}{P})_t$					1.144 (5.93)	1.144 (5.77)	0.764 (5.47)	1.011 (1.97)	0.911 (1.34)	0.990 (1.67)	1.254 (8.11)
(HS) <sub>t</sub>											0.0189 (4.75)

Notes:

(1) Definition of variables:

a. Total unemployment rate  $U_t^* = \frac{\text{Total LF} - \text{Total Employment}}{\text{Total LF}}$  100

/cont'd over.....

b.  $\left(\frac{\dot{U}}{U}\right)_t$  : annual percent changes in non-agricultural U rate.

c. The rates of change are defined as follows:

$$\left(\frac{\dot{X}}{X}\right)_t = \frac{X_{t+1} - X_{t-1}}{2X_t} \cdot 100 \quad \left(\frac{\dot{X}}{X}\right)_{t-\frac{1}{2}} = \frac{X_t - X_{t-1}}{X_{t-1}} \cdot 100$$

For a discussion of these definitions see Lipsey (2), footnote 2, page 2-3.

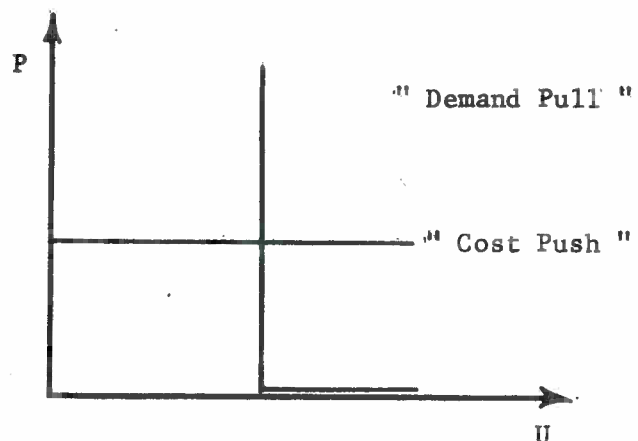
d. For the definitions of the dependent variable as well as other variables involved see note (1) to Table II-1.

(2) t ratios are given in brackets below the estimated coefficients.

(3) The first six equations and the last one are estimated over the period 1950-70; eq. no. 7 over the period 1950-59; the remaining equations over the period 1960-70.

which prevails as the joint result of demand and cost factors <sup>36</sup>.

Fig. 7



As the last point of this section, in Table II-3 we have reported a series of regression equations whose purpose is twofold. The first four equations intend to provide a more correct specification for the 1950-59 wage dynamics which, as it has been seen, is not satisfactorily explained by equation {II-1}. The remaining equations instead provide a different interpretation of the results obtained by Tarantelli (38) concerning the wage equation. For this reason these equations have been estimated using his own data and over his own period <sup>37</sup>.

Briefly commenting on the results, it seems verified that the wage dynamics of the period 1950-59 has been determined by the lagged operation of the labour market in which the continuous withdraw of labour, due to significant emigration, contributed to the creation of some additional pressures. Moreover, it is to be noted that when our equations nos. 6 and 8 are compared with equations nos. 5 and 7 respectively (equat. no. 5 corresponds to that estimated by Tarantelli <sup>38</sup>) the former give better statistical results in terms of  $\bar{R}^2$  and significancy of all variables. In each of the four equations, however, exists a severe problem of collinearity between the two variables relating to unemployment. This, of course, may have affected the reliability of both Tarantelli's and ours' estimates.

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36 As well-known Schultze explains inflation as the result of sharp changes in the composition of sectoral demand for labour and capital given the downward rigid structure of prices and wages in the economy.

37 The data used by Tarantelli over the period 1951-68 differ from ours as far as wage and price changes are concerned. The wage rate has been obtained from the national accounting statistics as the ratio of total earnings of employees in industry to an estimate of the number of equivalent full time employees. Instead of the cost of living index the implicit deflator for private domestic consumption has been used.

38 See Tarantelli (38), page 137 equation 4.



Table II-3

Estimation method : Ordinary least squares (OLS)

No. Statistics	1	2	3	4	5	6	7	8
$R^2$	79.25	99.48	99.49	98.94	75.30	80.00	75.86	89.31
DW	1.94	1.47	2.06	1.27	1.94	2.20	1.92	2.19
F	12	451	459	356	18	24	19	48
<b>Variables</b>								
Constant	0.405 (0.259)				-13.31 (-2.56)	-19.66 (-3.37)	1.123 (0.97)	0.918 (1.19)
$(\frac{1}{U})_t$	13.839 (1.47)				64.046 (3.76)	79.181 (4.50)	47.374 (4.13)	72.787 (7.37)
$(\frac{\dot{P}}{P})_t$	1.046 (4.60)	1.020 (10.0)	1.239 (8.96)	0.996 (7.15)	0.789 (2.70)	0.828 (3.27)	1.00 (3.76)	1.278 (7.24)
(Eur. Migr.) <sub>t-1</sub>	0.0104 (1.793)	0.0109 (2.516)						
(Tot. Migr.) <sub>t-1</sub>			0.0089 (2.557)					
$(\frac{1}{U})_{t-1}$		20.201 (4.94)	21.249 (4.91)	13.075 (3.23)				-58.25 (-5.97)
$U_{t-1}$						1.481 (3.61)		
$U_{min_t}$					1.051 (2.843)			
$(\frac{1}{U_{min}})_t$							-24.81 (-2.928)	

Notes:

(1) Definition of variables

- a. (Eur. Migr.): Migration balance within European Countries.
- b. (Tot. Migr.): Migration balance in the world as a whole.
- c.  $U_{min_t}$  : the minimum level of U experienced before t.
- d. For the definitions of the dependent variable as well as other variables involved see note (1) to Table II-1 and footnote 37.

(2) t ratios are given in parentheses below the estimated coefficients.

As far as the different interpretation is concerned we are interested in the economic rationale underlying the variable  $U_{min, t}$ . In Tarantelli's analysis  $U_{min, t}$ , the minimum level of unemployment reached before  $t$ , is supposed to represent the limit of the trained labour force, therefore a sort of index for labour force heterogeneity. What this implies is that for an economy characterised by falling unemployment  $U_{min}$  accounts for a reduction of the inflationary pressures. However, our equations nos. 6 and 8 in which  $U_{min, t}$  has been replaced by  $U_{t-1}$ , suggest that behind  $U_{min}$  there is nothing else (at least as far as Italian experience is concerned) other than a particular lag structure of the labour market. According to the lag structure the long run operation of the labour market would be established. The positive sign of  $U_{t-1}$ , as originally noted by Phillips (1), can be explained by noticing that  $(\dot{w}/w)_t$  is greater when  $U$  is falling and less when  $U$  is rising.

Finally, Fig. 8 shows for the two sub-periods as well as for the whole period, both the observed and predicted wage dynamics. It is interesting to note how well our analysis accounts for the exceptionally large wage increases which occurred in 1963 and 1969.

### III. Hidden unemployment, hoarded labour estimates and the 'augmented' Italian Phillips' curve.

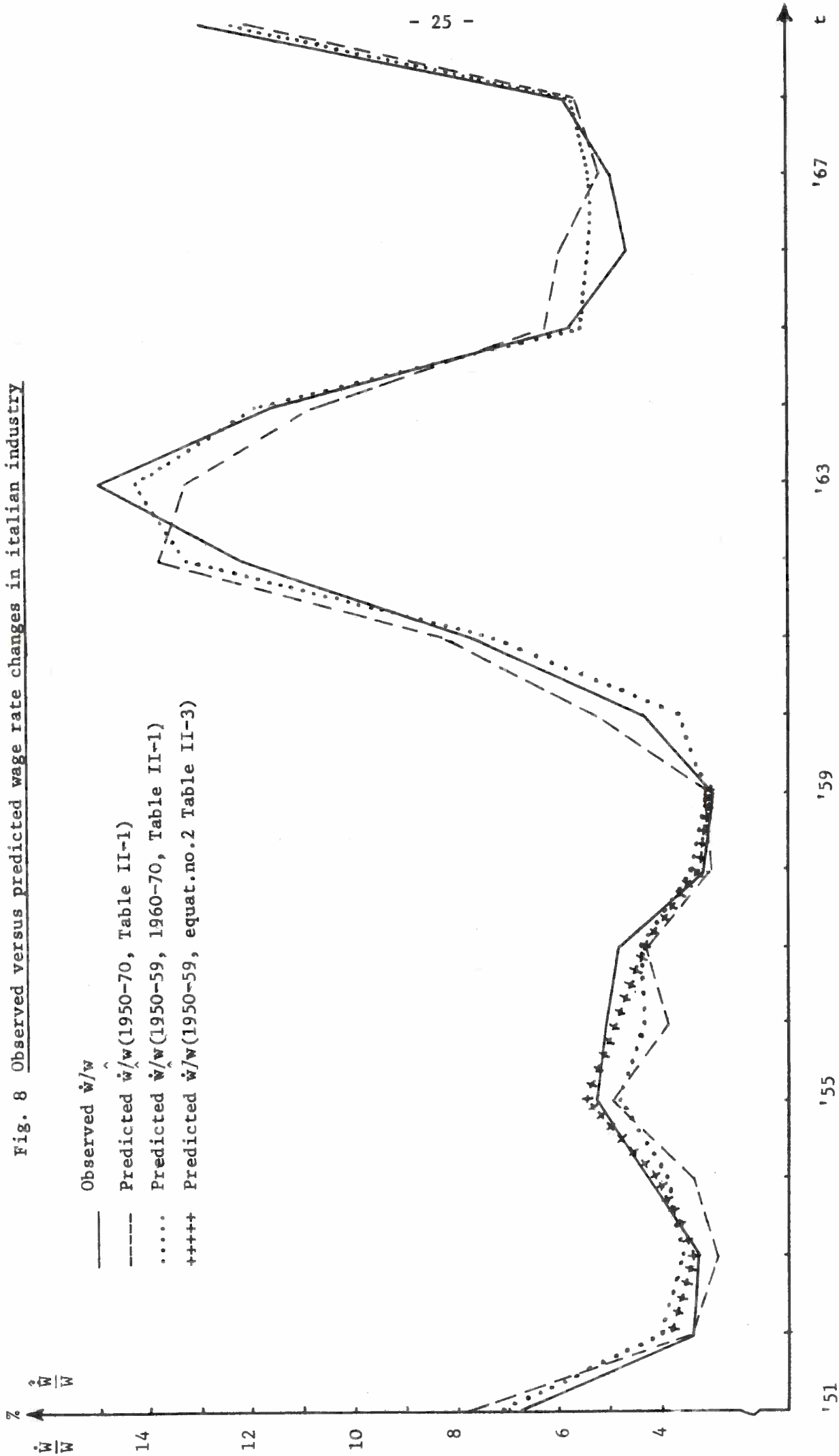
We have already mentioned in section I the deficiencies of  $U$  statistics used as a 'proxy' for the pressure of demand in the labour market. From the econometric point of view such deficiencies, namely the use of a proxy which does not make use of all the sample information and measures with error instead of what it ought to measure correctly, result in inefficient and inconsistent estimates. In fact, while inefficiency is due to the fact that the estimator is not 'sufficient', inconsistency is due to errors in measurement.

It has been suggested that in order to have an efficient indicator of the excess demand in the labour market it is necessary that the  $U$  statistics also measure the degree of 'underutilisation' of the labour supply. And this can be done once the concept of unemployment has been widened to those of 'hidden' unemployment and 'hoarded' labour <sup>39</sup>.

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39 See Taylor (18).

Fig. 8 Observed versus predicted wage rate changes in Italian industry



These two new aspects of unemployment are easily explained if we give attention both to the potential components of the labour supply and to the fact that U statistics measure only one dimension of the extent of the utilisation of labour.

If, according to what several recent studies<sup>40</sup> have shown, we admit the cyclical variability of the labour supply it is easy to single out hidden unemployment in that part of unemployed, who 'discouraged' decide to leave the labour force until the improved economic situation will enable them to find a new job<sup>41</sup>.

Moreover, the eventual hoarding, depending on the different extent to which labour is utilised during the business cycle<sup>42</sup>, is only measurable on the basis of the labour productivity statistics.

The aim of this section is then to estimate first non-agricultural hidden unemployment and labour hoarding in Italian industry for the period 1959-70. In a second stage we shall utilise such estimates in order to get a 'broadened' estimator of the excess demand for labour. At the end we shall verify if by using that broadened indicator it is possible to formulate a pure 'augmented' Phillips curve, i.e. based, as in its original form, only on variables related to the labour market.

The theoretical basis of this reasoning lies in considering hoarded labour and hidden unemployment as labour reserves of first and second degree respectively. Namely, it is hoarded labour which is absorbed first when the demand for labour increases. Only later and according to entrepreneurs' expectations will hidden unemployment be absorbed as well<sup>43</sup>. This in terms of the Phillips curve clearly means a reduction of the upward pressure on money

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40 See the papers mentioned in footnote 7.

41 In the economic literature two conflicting theories of labor force participation have been formulated. The 'discouraged worker hypothesis' holds that the 'secondary workers' (especially women) stop seeking work when there is little chance of a job being found for them. The 'additional worker hypothesis' states just the opposite: the secondary workers enter the labour force when the 'primary' (especially males) lose their jobs because of the low level of economic activity. The former in general is found to be the dominant one.

42 See for instance Okun (49).

43 Notice how this implies that U statistics are always a lagged indicator of changes in the level of economic activity and that, after certain specifications, hoarded labour could be a better short run indicator. For an analysis of the interrelations between employment and average hours worked in the Italian industry, see Salvati (50), page 135-42.

wage rates. As far as hoarding is concerned this reduction of pressure could be interpreted as a result of a reduction in entrepreneurs' willingness to grant new wage increases.

Finally, note that hidden unemployment and hoarded labour will probably have a lagged influence on wage dynamics.

Since La Malfa and Vinci's (19) paper, addressed to the explanation of the decreasing Italian labour force participation ratio, presents strong evidence to suggest that the male participation in the labour force is rather stable, we simplified our analysis of hidden unemployment confining our attention only to the non-agricultural female labour force.

The analysis is viewed in the manner suggested by Taylor (18), i.e. adopting the same technique used by Klein and Summers (51) in estimating capacity utilisation<sup>44</sup>.

As well-known the Wharton School technique is essentially a graphical method. Namely, referring for instance to the graph of female labour participation ratio  $(L/P)_t$  of Fig. 9, the question is to isolate those peaks where, on the basis of well-founded indications, we can suppose labour force reached its cyclical maximum. Once having chosen the relevant peaks, these are joined by fitting linear segments in order to generate for all other points the 'full employment participation ratio'  $(L/P)_t^*$ <sup>45</sup>. Hidden unemployment (in thousands) is then estimated applying the following relation:

$$(HID)_t = P \left\{ \left(\frac{L}{P}\right)_t^* - \left(\frac{L}{P}\right)_t \right\} \cdot \frac{1}{100} \quad \{\text{III-1}\}$$

where, L = non-agricultural female labour force (in thousands)

P = female population aged 14 to 64 years (in thousands)

Referring to the graph of labour productivity  $(Y/E)_t$  in industry (see Fig. 10), the same can be stated for hoarded labour. If for the chosen 'maximum' peaks by assumption we hypothesize the utilisation rate of employed

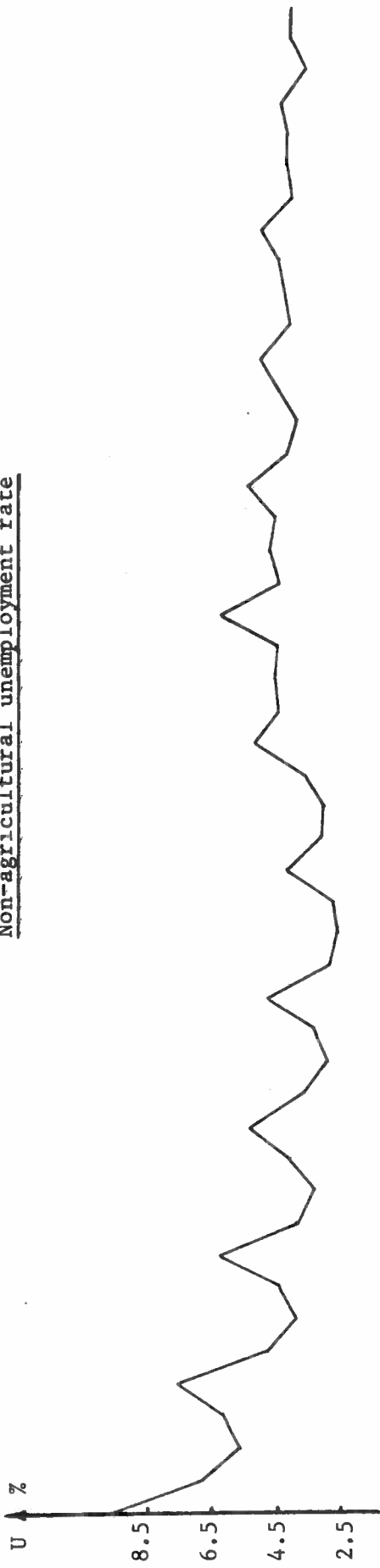
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44 For an estimate of capacity utilisation in Italian industry according to this method, see Rey (52).

45 In this context it is to be noted that, just because of the decreasing participation ratio, the concept of 'full employment participation' can be extremely hazardous and however it must be referred to the short run only. A negative time trend effect, which should stand for the demographic factors and sociological changes in attitudes towards work and leisure is found operative by La Malfa and Vinci's (19) analysis, but of little contribution in explaining the decreasing participation ratio.

Fig. 9

Non-agricultural unemployment rate



Non-agricultural female participation ratio

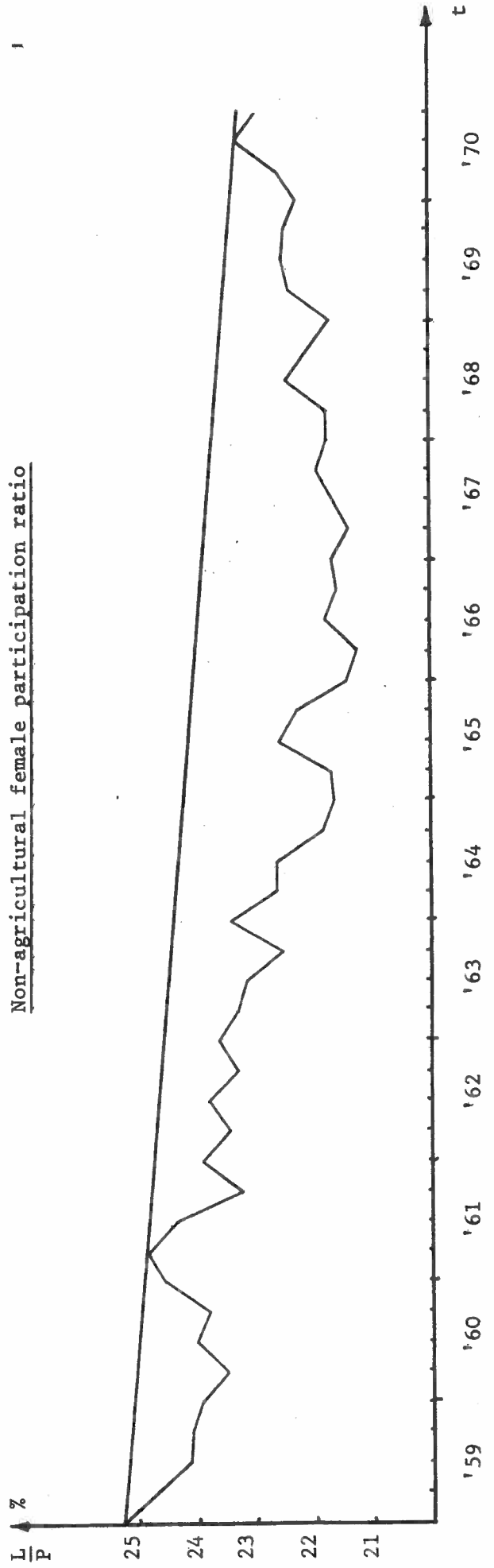
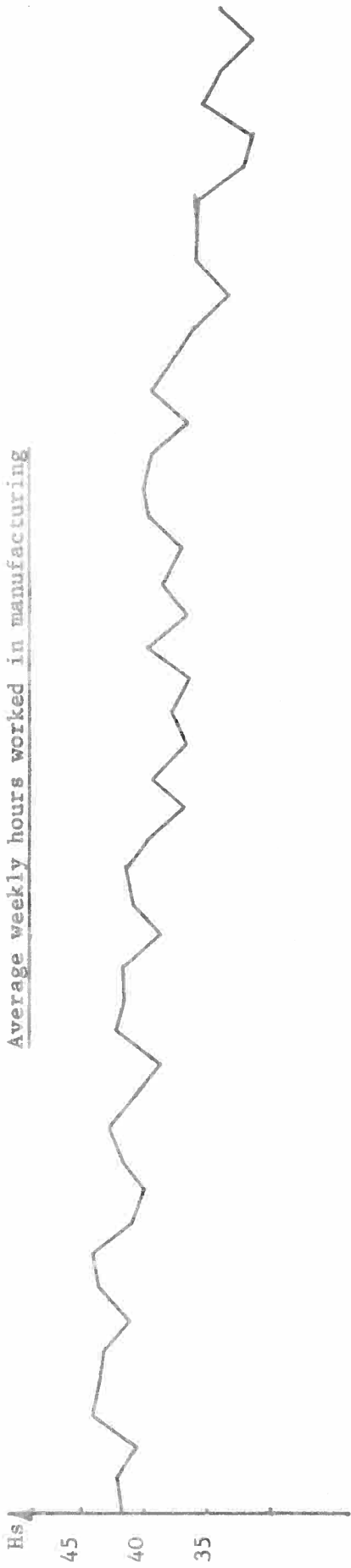
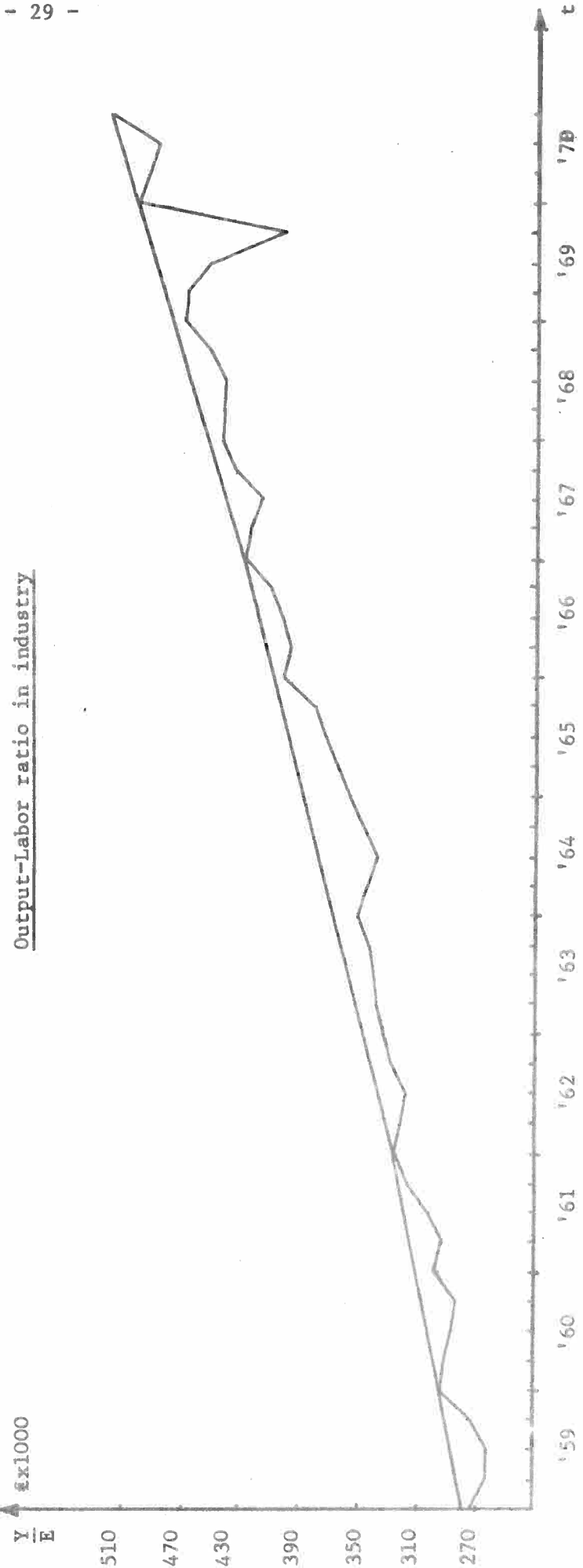


Fig. 10

Average weekly hours worked in manufacturing



Output-Labor ratio in industry



labor is 100%, hoarded labor is given by :

$$(HOA)_t = \left\{ 1 - \frac{(Y/E)_t}{(Y/E)_t^*} \right\} E_t \quad \{ III-2 \}$$

where, Y = GNP at factor cost of the industrial sector (in thousands millions of 1963 lire)

E = employees in the industrial sectors (in thousands)

In order to facilitate the choice of 'maximum' peaks, as a priori information we have used, for hidden unemployment, the total non-agricultural unemployment rate and, for hoarded labor, the series of average weekly hours worked in manufacturing.

The estimated equations for the straight lines are :

Hidden Unemployment (see Fig. 9)

1959 I - 1961 II	$\left(\frac{L}{P}\right)_t^* = 25.240 - 0.0477 t$	$t = 0 \dots 9$
1961 II - 1970 III	$\left(\frac{L}{P}\right)_t^* = 25.180 - 0.0418 t$	$t = 9 \dots 47$

Hoarded Labor (see Fig. 10)

1960 I - 1962 I	$\left(\frac{Y}{E}\right)_t^* = 276.710 + 4.040 t$	$t = 0 \dots 12$
1962 I - 1967 I	$\left(\frac{Y}{E}\right)_t^* = 263.772 + 5.118 t$	$t = 12 \dots 32$
1967 I - 1970 I	$\left(\frac{Y}{E}\right)_t^* = 234.384 + 6.037 t$	$t = 32 \dots 47$

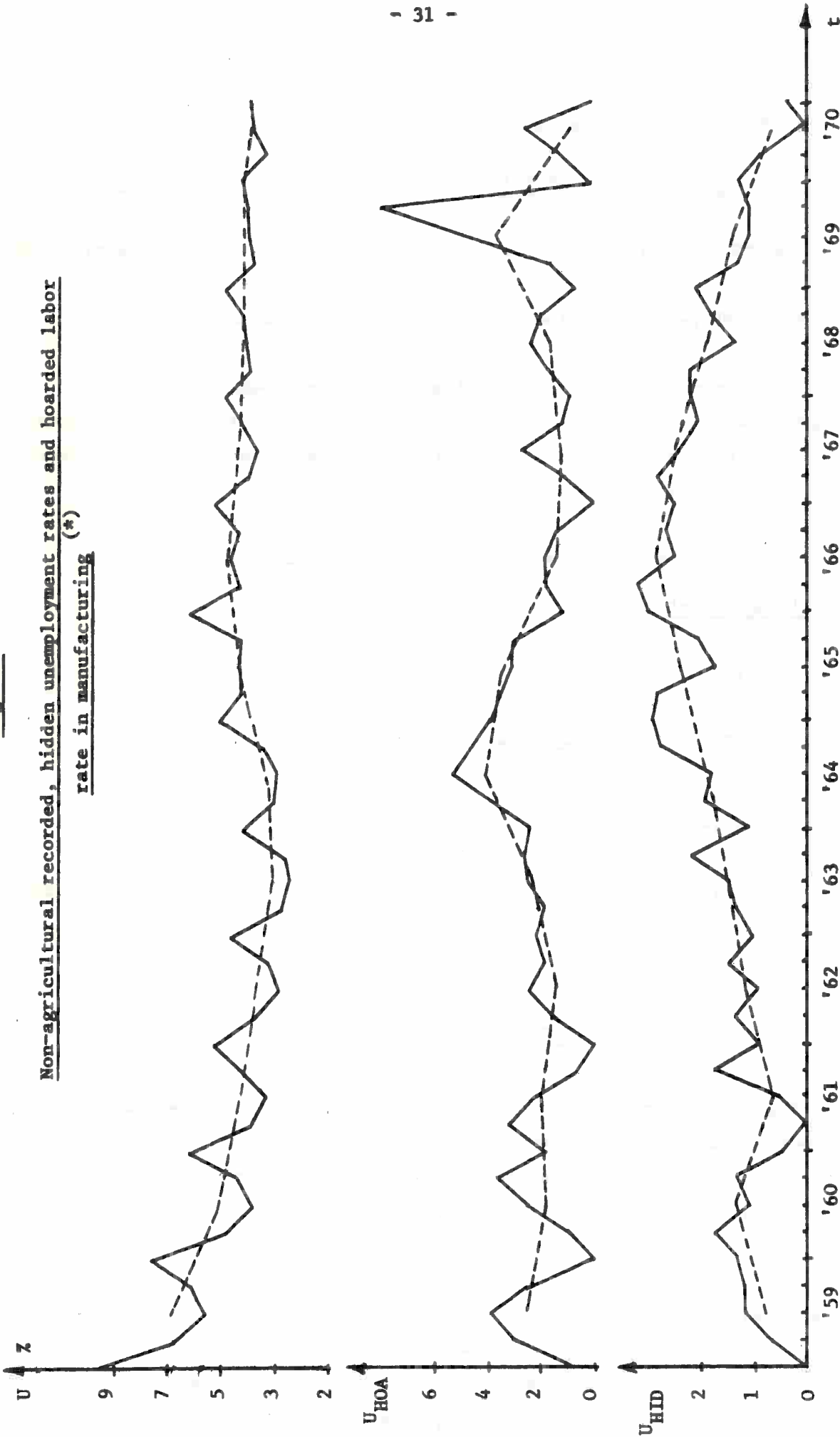
Fig. 11 compares the trends of non-agricultural unemployment rate U with those of hidden unemployment  $U_{HID}$  and hoarded labor  $U_{HOA}$ . In order to define the appropriate lag structure, especially interesting is the relationship between U and  $U_{HOA}$  which indicates that  $U_{HOA}$  tends to lead U.

The approximate nature of the estimates obtained depends largely on the three major evident limitations of the "trend-through-peaks" procedure. First of all the selection of the 'maximum' peaks is crucial and it is hardly possible to isolate them with a sufficient certainty; further complications arise since all peaks ought to be of equal strength. Secondly, the necessity



Fig. 11

Non-agricultural recorded, hidden unemployment rates and hoarded labor rate in manufacturing (\*)



(\*) For the definitions of  $U_{HOA}$  and  $U_{HID}$  see notes to Table III-1.

to extrapolate at the beginning and at the end of the series when it does not start or end with one of the chosen peaks introduces some possible elements of error. Thirdly, the hypothesis of a linear trend is difficult to justify both for the participation ratio and for  $(Y/E)_t$ , and certainly it introduces an error which should be inversely related to the number of 'maximum' peaks chosen.

Bearing in mind the limitations of our analysis, what remains to be seen is the performance of the new components of unemployment in explaining money wage changes. In order to facilitate the comparison with the previous results the following regressions have been estimated on an annual basis over the period 1960-70. In Table III-1 we have reported the most significant results.

Concluding this section, notice that the results support the hypothesis of the existence of an "augmented" Phillips relationship. Moreover, comparing equation no. 5 (see Table III-1), which includes only the market indicators we have specified, with equation no. 8 of Table II-2, which constitutes the conventional Phillips curve including both a market proxy and a price variable, the former is found to perform better than the latter.

Finally, a peculiar result has to be pointed out. While  $(\dot{U}/U)_t$  has never come out significant and often with the wrong sign too (see also Table II-2),  $(U_{HID} + U_{HOA}/U_{HID} + U_{HOA})_t$  in equation no. 5 of Table III-1 is found to be a relevant variable. This leads us to advance an interesting interpretation. The entrepreneurs found their expectations on changes in  $U_{HID}$  and  $U_{HOA}$ , which should be better indicators of the economic situation in the short run, rather than on changes in recorded  $U$ . However, it is very important to notice here that in order to be able to use properly  $U_{HOA}$  as short period indicator, labor productivity statistics should be corrected for the effects that factors not directly related to entrepreneurs' decisions (strikes for instance) have on the real hoarding.

Table III-1

The 'augmented' Phillips curve for the period 1960-70.

Estimation Method : Ordinary least squares (OLS)

No. Statistics	1	2	3	4	5
$\bar{R}^2$	66.40	68.25	66.94	69.59	81.72
DW	1.36	1.53	1.33	1.63	1.93
F	21	12	11	13	16
<u>Variables</u>					
Constant	-12.592 (-2.756)	-14.720 (-3.081)	-13.501 (-2.927)	-13.018 (-2.987)	-26.336 (-4.024)
$(\frac{1}{U})_t$	84.053 (4.665)	91.383 (4.931)	81.762 (4.542)	68.263 (3.294)	108.076 (4.655)
$(\dot{\frac{1}{U}})_t$		-0.0645 (-1.21)			
$(\frac{1}{U_{HID}})_{t-1}$			2.012 (1.063)		
$(\frac{1}{U_{HID}+U_{HOA}})_{t-1}$				15.644 (1.355)	28.049 (2.707)
$(\frac{U_{HID}+U_{HOA}}{U_{HID}+U_{HOA}})_t$					-0.116 (-2.376)

Notes:

(1) Definition of variables

- a. Non-agricultural hidden unemployment rate  $U_{HID} = \frac{\text{Hidden Unemp.}}{\text{Potential LF}} \cdot 100$ .
- b. Industrial hoarding rate  $U_{HOA} = \frac{\text{Hoarded labour}}{\text{Potential LF}} \cdot 100$
- c. Potential LF = Non-agricultural LF + Hidden Unemployment
- d. For the definitions of the dependent variable as well as other variables involved see note (1) to Table II-1.

- (2) t ratios are given in brackets below the estimated regression coefficients.

#### IV. Economic policy implications and conclusions

In this paper we have presented an empirical analysis of money wage changes in Italian industry from 1950 to 1970. We found that the level of money wage rates actually set in the short period is primarily the outcome of both economic and institutional factors. Moreover, to relate our analysis to the specific issues posed in the introduction, it is to be noted that the results depict an economy which, starting with an almost unlimited labor supply, experienced intense structural changes, and finally approached a serious bottleneck.

We questioned the view put forward by Modigliani and Tarantelli of an improvement in the trade-off between employment and price stability. On the basis of a statistically supported difference between the two sub-periods considered, we argued that the economy has become more inflation-prone since the beginning of 1960's. The fact that our analysis does not entirely support the results obtained by Modigliani and Tarantelli suggests that the interpretation of empirical results must be done with extreme care. Care must be taken firstly, since the results are sensitive to both the data and the specification of the model and secondly since uncertain results may suggest non-appropriate policy action.

Two points may be made in this connection. In the first place our results allow us to say that at the present time the economic policy horizons do not seem to be widened and secondly, according to the definition given for structural unemployment, that some selective labor market policies are needed in order to overcome the structural bottleneck experienced by the Italian economy.

It seems worth while spending a few words on the last point. First we think the structural bottleneck can be explained reasonably well in terms of a modification in the demand for labor. Two basic factors seem to have forced this modification, firstly the redistribution of labor involved in technological changes and secondly the increased rigidity of the wage structure due to the sharpness of union operation.

Furthermore, a change in the demographic composition of the labor force, because of the different degrees of "attachment" of its various sectors, is not to be undervalued as a possible source of upward pressures on wages. In fact, the statistics of population distribution by age and sex reveal a clear tendency for the central classes of the population, those more attached to the labor force, to decrease whereas the upper marginal class (over 60) increases.

The presence of these structural elements should beware the policy makers to pay careful consideration in choosing the appropriate policy mix capable of alleviating unemployment without necessarily stirring up inflationary pressures. In this context, if selective labor market policies (such as training and retraining opportunities, especially for those who leave agriculture and for those whose skills are obsolescent, relocation of industries to depressed areas<sup>46</sup> and better information services) have to be recommended in order to lessen through increased mobility the frictions of the market, it must also be stressed the need of policies directed at the creation of new jobs.

In fact, according to our analysis, to the extent to which one wishes to see hoarded labor and hidden unemployment absorbed together with less risk of creeping inflation, the two kinds of policies indicated are not alternative but mutually reinforcing. This suggests, perhaps, it is on the policy ground that the rigid theoretical positions of the structural-demand deficient debate can find a synthesis.

Finally it is important on one side to remind the reader of the instability of the Italian Phillips curve which suggests a limited and careful use of it in policy decisions, and on the other to stress the importance of better statistical information in order to facilitate both the diagnosis of the economic situation and the choice of the most effective package of economic tools.

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46. In fact we do not believe that in the long run, in order to remove the regional pockets of structural unemployment, the best policy is to allocate labor where industries are. This creates the heavy structural and social problems, well-known nowadays, without solving the problems of a dual economy. How regional distribution of unemployment affects the determination of aggregate wages is now being studied and the results will be reported later on.

## Appendix

### I Statistical sources

1. Index numbers of minimum contractual wage rates and cost of living : "Rassegna di Statistiche del Lavoro"(CGII) and "Bollettino mensile di Statistica"(ISTAT).
2. All labor force statistics : "Annuario di Statistiche del Lavoro e della Emigrazione"(ISTAT), "Statistiche del Lavoro"(Min. del Lav. e della Prev. Soc.), "Occupazione in Italia negli anni 1951-65-Industria"(ISTAT,1966), "General Statistics"(OECD).
3. Emigration and hours lost in strikes : "Annuario di Statistiche del Lavoro e della Emigrazione"(ISTAT).
4. GNP at cost factor : "Quadri della Contabilita' nazionale"(Isco).
5. Hours worked in manufacturing : "Statistiche del Lavoro"(Min. del Lav. e della Prev. Soc.).

### II Reliability of data

It is necessary to give here some account of the data used in the research, because their nature and appropriateness make it necessary to qualify the results obtained.

The most serious doubts arise with regard to the cost of living, the minimum contractual wage index and U statistics. As far as the data on wages and prices are concerned it is important to make clear that ISTAT both renewed, on several occasions, the series and modifying the coverage. Hence, in order to obtain a continuous series over the period considered it has been necessary to link together the existing series. For a critical examination of ISTAT indexes, see Broglia and Pallagrosi(53).

With regard to U statistics it is to be noted that while non-agricultural U from 1954 onwards comes out from ISTAT labor force surveys, before 1954 it has been estimated, according to Sylos Labini(37a), as the sum of the unemployed in extra-agricultural activities registered in the first and second categories ("1<sup>a</sup> and 2<sup>a</sup> Categoria") by the Ministry of Labor and Social Security.

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