

IMF WORKING PAPER

© 1996 International Monetary Fund

This is a *Working Paper* and the author(s) would welcome any comments on the present text. Citations should refer to a *Working Paper* of the International Monetary Fund, mentioning the author(s), and the date of issuance. The views expressed are those of the author(s) and do not necessarily represent those of the Fund.

WP/96/36

INTERNATIONAL MONETARY FUND

European I Department

**Italian Unemployment 1975-95: An Analysis of Macroeconomic Shocks  
and Policies Using Evidence from a Structural Vector Autoregression**

Prepared by Charalambos A. Christofides 1/

Authorized for distribution by Alessandro Leipold

April 1996

Abstract

This paper examines the determinants of Italian unemployment by estimating and utilizing a structural vector autoregressive (VAR) model. Both long-run and short-run macroeconomic determinants of unemployment are examined; the latter are analyzed in much greater detail than is customary in the literature. The relative contribution of long-run and short-run causes is quantified and the different time horizons over which they operate are identified. Policies affecting labor market performance are described and their effect estimated whenever data permit; policy implications are also drawn whenever possible. The most recent labor market reforms together with the atypical effects of the most recent recession are examined, and forecasts of unemployment are produced. A number of scenarios are also constructed to highlight the effect of alternative labor market arrangements.

JEL Classification Numbers

E24, J38, J58, J68.

---

1/ This paper was written as part of a broader European I department project on European unemployment. The author wishes to thank D. Demekas, J. Franks, K. Habermeier, T. Lane, P. Mauro, T. Pujol, R. Ramaswamy, M. Russo, T. van der Willigen and especially B. Henry, M. Karanassou, A. Leipold, A. Prati and D. Snower for many valuable discussions and insights. P. Gillett, X. Gong, A. McCaul and L. Monasi provided excellent research assistance, and G. Jeffers and V. Pabst provided excellent publication support. Any remaining errors are the author's responsibility.







<u>Contents</u>	<u>Page</u>
Summary	iii
1. Introduction	1
2. An overview of macroeconomic, labor market and institutional developments	2
3. A model-based analysis of historical developments	7
4. Evidence on labor market policies and lagged effects	16
5. The recent recession and increased labor market flexibility	23
6. The future	25
7. Conclusion	26
APPENDIX I: Labor Market Events	27
APPENDIX II: Data Sources and Definitions	29
APPENDIX III: Estimation and Testing of the Labor Market Model	30
APPENDIX IV: Inference Reliability in the Presence of Nonstationarity	31
References	33
Charts	
1. Adjusted vs. Unadjusted Unemployment	2a
2. Unemployment vs. Inflation	2b
3. Real Capital Stock vs. GDP	2c
4. Competitiveness	2d
5. Social Security Contribution Index	4a
6. Participation Rate	4b
7. Wedge	8a
8. Persistence vs. Imperfect Responsiveness	22a
9a. Impulse Responses, Labor Demand (Temporary shock)	22b
9b. Impulse Responses, Labor Demand (Permanent shock)	22c
10a. Employment and Unemployment	24a
10b. Labor Force and Real Wages	24b
11. Behavior of the Business Cycle, 1973-94 (Industrial Production)	24c
12. Behavior of the Business Cycle, 1973-94 (Employment)	24d
13. Behavior of the Business Cycle, 1973-94 (Labor Force)	24e
14a. Employment and Unemployment	26a
14b. Labor Force and Real Wages	26b
15a. Employment and Unemployment (Post 1994 scenarios)	26c
15b. Labor Force and Real Wages (Post 1994 scenarios)	26d







### Summary

This paper outlines macroeconomic, labor market, and institutional developments in Italy during 1975-94, with a special emphasis on labor market rigidities, which are linked to specific policies. For most of the period under review, firms were subject to hiring and firing restrictions, wages were highly indexed, and wage bargaining was centralized and dominated by national unions and employer associations. To quantify the effect of these policies, a structural vector autoregressive model (VAR) is estimated.

The model, consisting of three main equations--an employment equation, a wage-setting equation, and a labor supply equation--estimates labor market rigidities, which result in strong persistence for employment, real wages and the labor force, and long adjustment lags. The model is then used to perform a number of historical experiments. One finding is that the reforms implemented in the early to mid-1980s were largely ineffective in reducing labor market rigidities. Another finding is that the Italian labor market is sluggish in responding to both temporary and permanent shocks, in large part because of wage staggering and hiring and firing costs. The VAR also provides a variance decomposition of unemployment. Although the variance decomposition does not allow the effect of lags to be separated out from the effect of other shocks, it is useful because it quantifies the relative historical importance of different shocks in explaining unemployment. Labor force shocks (especially changes in the female participation rate) were found to be particularly important for Italy. Secular declines in capital formation and output growth, competitiveness shocks, and continuing increases in social security contributions also played an important role.

Finally, the model is used to examine the effect of post-1991 labor market liberalization measures that, coincident with the recent recession, resulted in large employment losses. Evidence of increased labor market flexibility is found, consisting of lower persistence in the key variables, and statistical tests confirm that the estimated parameters have changed. The model is simulated to produce a baseline forecast of labor market aggregates consistent with October 1995 WEO forecasts. Although baseline unemployment remains high, if labor market liberalization measures are consolidated or, better, strengthened, there is significant potential for reducing unemployment. A final model simulation, produced under the assumption that recent labor shedding by firms has run its course and that the early indications of improved labor market flexibility hold, shows that unemployment could fall considerably faster than a purely historical extrapolation would indicate.







## 1. Introduction

The substantial and persistent rise in Italian unemployment has prompted continuing academic and policy attempts to characterize its causes and provide possible policy responses. The research approach followed in this paper relies on two insights that appear not to have been fully utilized to date in the case of Italy or most other European economies that have experienced persistent unemployment. The main insight is that lags in labor market behavior are important and may reinforce one another. Thus, the full effects of a labor market shock on unemployment may take much longer to manifest themselves than the length of any simple lag, and unemployment may even overshoot its long-run equilibrium in response to either temporary or permanent shocks.

The second insight is that labor market policies can affect the length of the lags and thereby influence the speed with which unemployment recovers from a recession. This feature of policy is significant, because an important aspect of the unemployment problem in Italy, as in other European countries, is not just that unemployment is high on average, but that it takes a long time to fall after adverse shocks have occurred. A number of academic papers pointed out potential sources of lagged responses of unemployment, such as hiring and firing costs, labor force adjustment costs and insider employment effects. <sup>1/</sup> Thus, legislation on wage indexation, legal obstacles to firing and hiring, or even direct lagged responses to changes in policy variables such as tax rates can have an important impact on the speed with which unemployment adjusts to macroeconomic shocks. For time periods over which policy makers can have an impact (including not only on unemployment but also on inflation and other important macroeconomic aggregates) quantifying the sources and lengths of the various lags can be very important. It will be seen that the relevant lags can be quite long, but to the extent that they depend on policy, policies can to some degree reduce them: one can even argue that increasing labor market flexibility is synonymous with reducing the length of the lags. This is important in the present context, where the Italian authorities are adopting policies which are aimed to increase labor market flexibility and ultimately reduce unemployment.

The plan of the paper is first to provide an overview of macroeconomic, labor market and institutional developments for Italy. Then, a structural vector autoregressive (VAR) model is estimated which aims to identify the relevant characteristics of the Italian labor market and its responses to both endogenous and exogenous innovations. The technique of "variance decomposition" is used to identify the sources of changes in Italian unemployment and to characterize the time horizon over which different shocks lead to unemployment, and which lagged responses are important for them. Then, the model is extended to see whether identified policy innovations had an impact on the lags with which labor market variables respond to macroeconomic shocks. Because this technique does not

---

<sup>1/</sup> Karanassou and Snower (1994), henceforth referred to as "KS", provide a fuller explanation of these sources and how they are expected to affect the lagged responses of the labor market.



differentiate directly between lagged and contemporaneous effects, measures of unemployment "persistence" (when temporary shocks have longer lasting effects on unemployment) and of "imperfect responsiveness" (when unemployment reacts to permanent shocks with a lag) are computed for Italy. The model is then used to investigate whether institutional innovations attempted in the mid-1980s were effective in reducing labor market rigidities: it is found that they were not.

Finally, the model is simulated to investigate the impact of the most recent recession on unemployment in light of a number of important institutional developments and to provide forecasts for the future. The baseline forecasts appear to indicate that although some progress has been achieved in removing restrictions to employment, further policy innovations are likely to be required before a more fully satisfactory labor market performance can be achieved. However, some early evidence of increased labor market flexibility do exist. To investigate the potential size of the benefits from a truly flexible labor market, a "good case" scenario is also provided, which illustrates the speed with which unemployment could fall provided the lags were to be reduced significantly. It is found that the potential benefits are indeed substantial.

## 2. An overview of macroeconomic, labor market and institutional developments

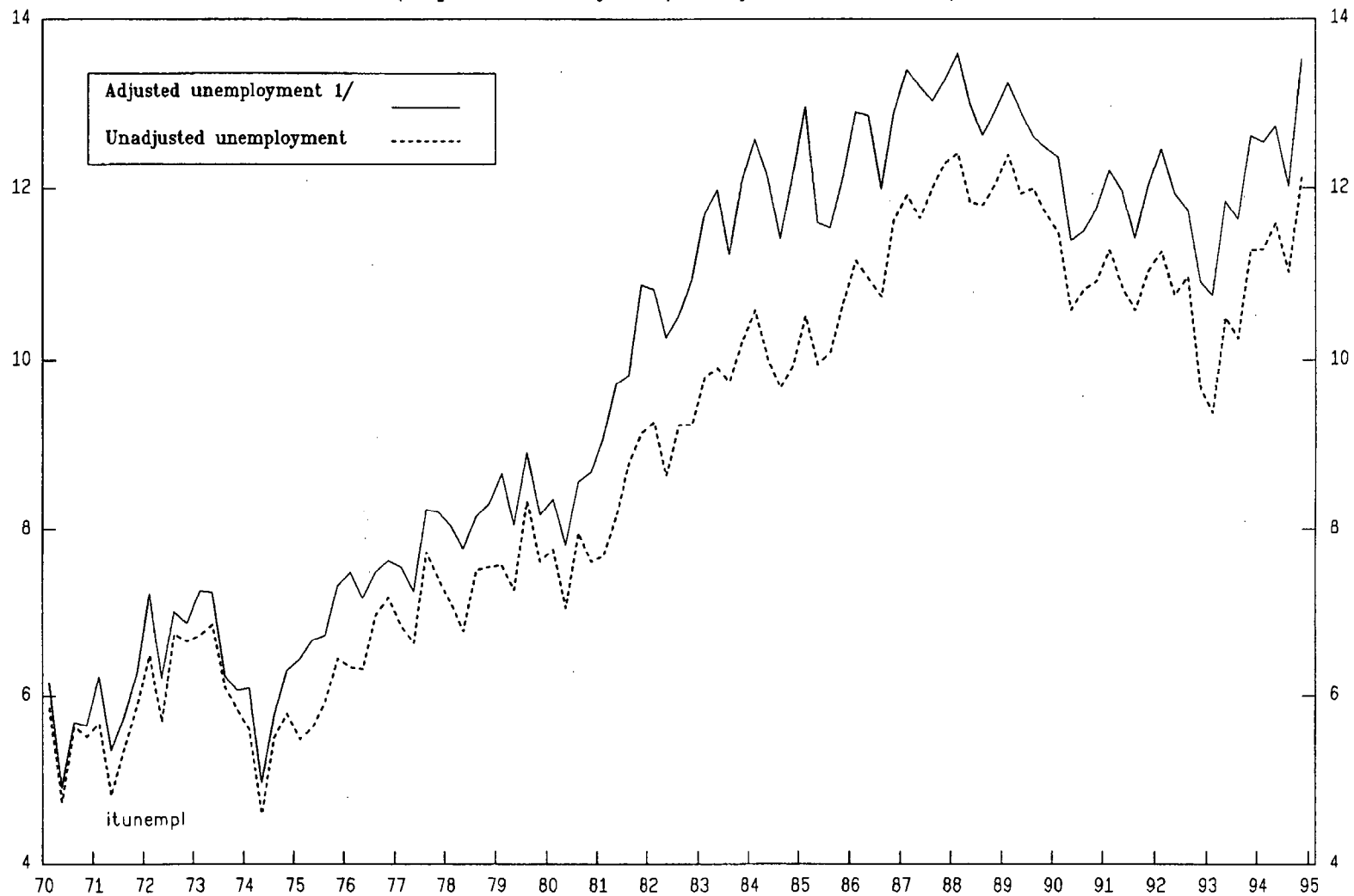
Aggregate unemployment in Italy has followed a pattern familiar from developments in a number of other European economies. From relatively low levels of around 6 percent in the early 1970s it began increasing after the first oil shock in 1974, reaching levels of 8 percent by 1980 (Chart 1). Unemployment accelerated after the second oil shock and continued increasing until about 1988, peaking at over 13 percent. Since then, it has fallen by about 2 percentage points following the economic recovery but lost all gains during the most recent recession which started at end-1991. From about 6 percent in 1971-72, inflation also increased significantly during the period 1973-80, indicating the presence of adverse macroeconomic supply shocks and accommodative aggregate demand policies by the authorities (Chart 2). Since 1981, a steady process of disinflation is in evidence, with inflation returning to 6 percent by 1986. From that time on, inflation has tended to track the economic cycle.

That important adverse macroeconomic shocks contributed to the rise in Italian unemployment is not in dispute. Real business sector capital stock has been in continuous decline in percentage terms (albeit punctuated by short-lived periods of resurgence) since about 1970. From a rate of increase of more than 1.2 percent per year, capital accumulation has slowed to just over 0.5 percent (Chart 3). Real GDP growth has also fallen, although there is also some evidence that its variability has declined between 1983-90. Competitiveness, defined as the ratio of the import price deflator over the GDP deflator, also turned sharply negative in the period 1974-83, reflecting movements in oil prices (Chart 4). In general the Italian economy has, however, been a beneficiary of movements in competitiveness. This is especially evident since 1985. At the same time,



CHART No 1  
ITALY

Adjusted vs. Unadjusted Unemployment  
(In percent of adjusted/unadjusted labor force)



Sources: Italian authorities, and Fund staff estimates.

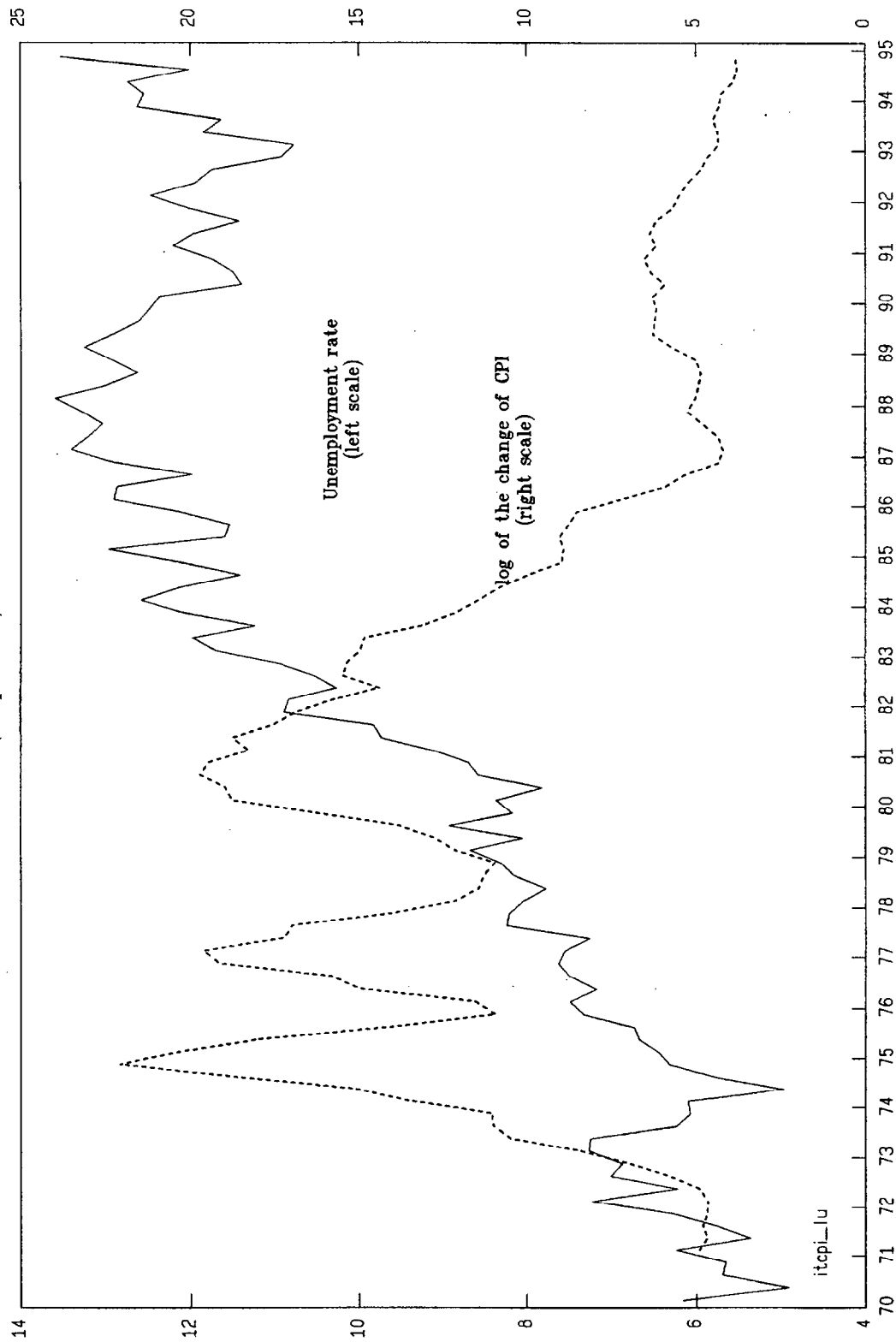
1/ Unemployment adjusted for the impact of the Wage Supplementation Fund.



CHART No 2

ITALY

# Unemployment vs. Inflation 1/ (In percent)

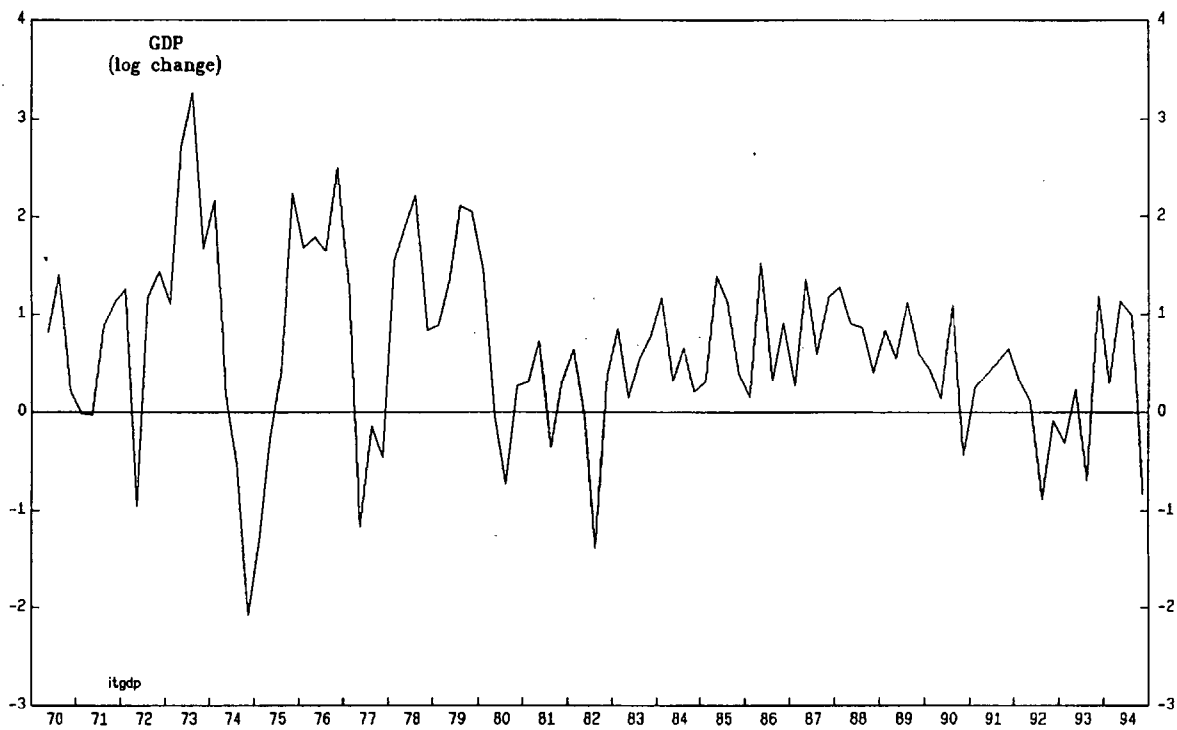
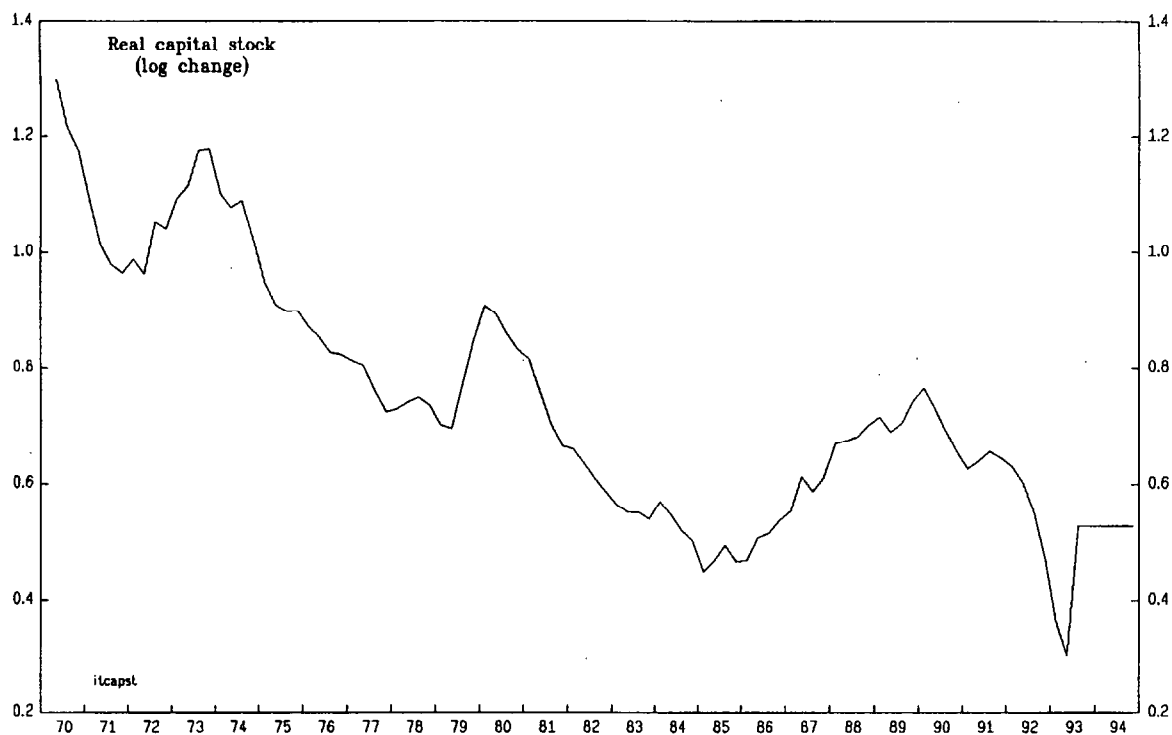


Sources: Italian authorities, and Fund staff estimates.

1/ Unemployment adjusted for the impact of the Wage Supplementation Fund.



ITALY  
Real Capital Stock vs. GDP  
(In percent)



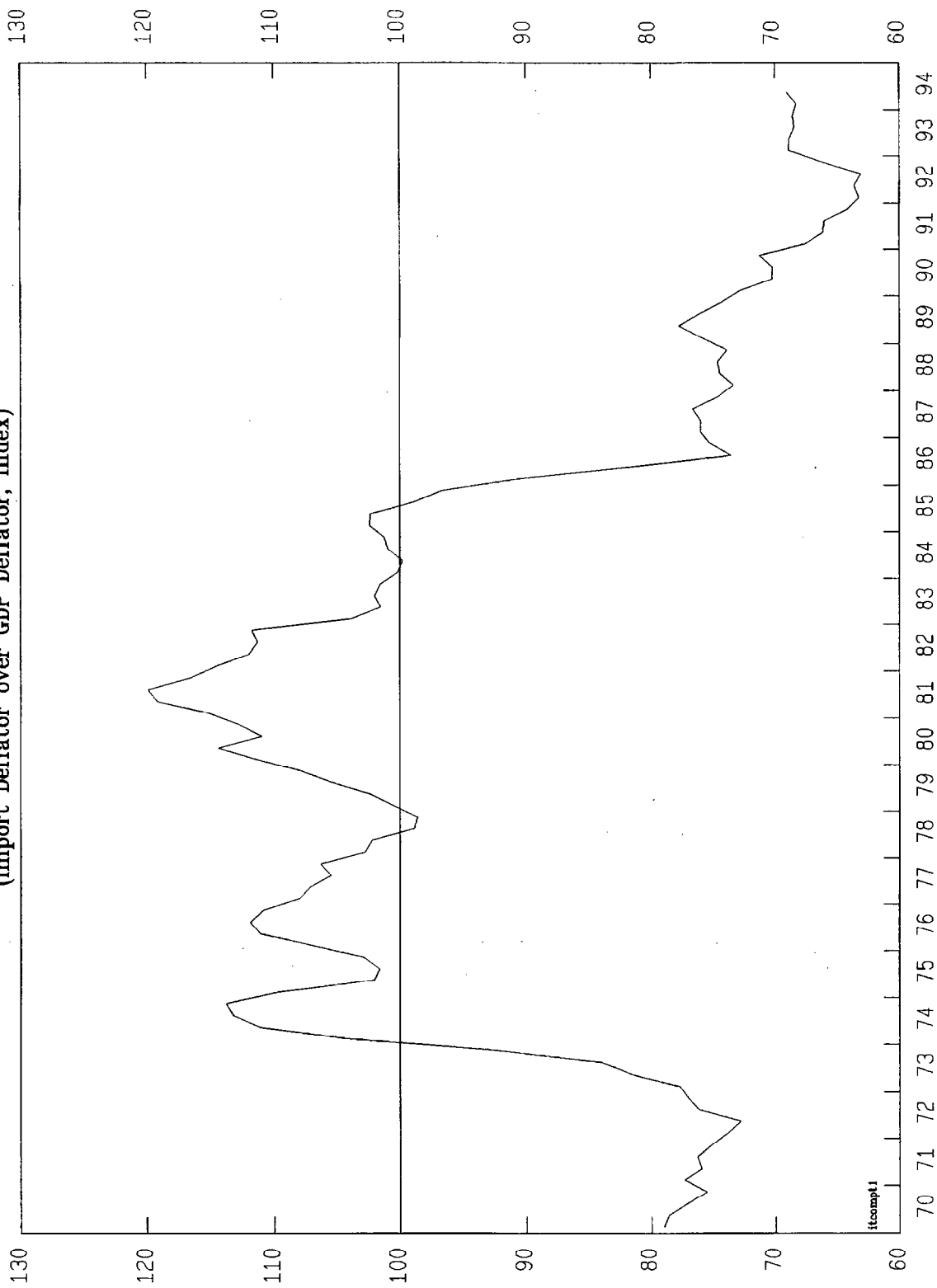
Sources: Italian authorities and Fund staff estimates.



Chart 4

ITALY

Competitiveness  
(Import Deflator over GDP Deflator, Index)



Sources: Italian authorities and Fund staff estimates.



social security contributions have been on a continuing upward path, punctuated by plateaus (Chart 5). This increased both costs of employment to employers and the wedge between pre- and post-tax returns to work.

Over this period, the labor force participation rate has also varied over and above the change that would normally be expected as a result of movements in employment. In the period 1972-76, participation was relatively low at 56.5 percent of working-age population, moderating the initial impact of the oil shock on unemployment (Chart 6). However, between 1976-81, the participation rate rose in two steps, reaching more than 59 percent by 1980, substantially exacerbating unemployment. This rise in the participation rate between 1972 and 1981 was entirely due to the increase in the female participation rate, which rose from 30.0 percent to 36.7 percent. The female employment rate jumped from 26.7 percent in 1972 to 31.4 percent in 1981, even as the female unemployment rate increased from 10.9 percent to 14.4 percent. The male participation rate, by contrast, fell from 78.2 percent to 75.1 percent. The male employment rate fell from 74.6 percent to 71.1 percent over this period, while the male unemployment rate increased marginally from 4.6 percent to 5.4 percent. <sup>1/</sup> By 1991, the female participation rate stabilized at 40.1 percent, and the female employment rate increased to 33.6 percent, while the male participation rate continued to fall, reaching 70.5 percent, as the male employment rate fell to 65.5 percent. Thus, aggregate unemployment at least partly reflected shocks arising from an increasing labor force participation rate for females; it will be seen later that this increase in the participation rate was partly caused by factors exogenous to the labor market.

In comparing Italian unemployment to that of other European countries it appears that, although the pattern of time-variation is similar, Italian unemployment is higher than the EU average: in fact, Italy has the third highest rate of unemployment after Spain and Ireland. This is the result of a striking regional dualism that has taken root in Italy, where the North is more industrialized and has unemployment rates that are relatively low, while the Center-South region is relatively more agrarian, more dependent on public employment, and has substantially higher rates of unemployment. In 1995, for example, the South unemployment rate was (according to the national definition) over 20 percent, a rate almost three times higher than in the Center-North. <sup>2/</sup> A very important explanation for the dual unemployment rate has in fact to do with the relatively small wage differentials between North and South despite wide productivity differentials. <sup>3/</sup> This point is further discussed below.

---

<sup>1/</sup> See de Luca and Bruni (1993), Table 8, p.22.

<sup>2/</sup> The reasons for the regional disparities are complicated, including historical developments, public policies, weaknesses in the political structures of the South, and proximity to the center of gravity of Europe. For a brief overview, see de Luca and Bruni (1993), pp.28-32.

<sup>3/</sup> Studies quoted by de Luca and Bruni (1993) put the productivity gap between North and South in industry at 75-80 percent.



Adverse macroeconomic shocks and the marked regional duality provide only one part of the explanation for Italy's higher unemployment rate. Another part has to do with the institutional framework in the labor market and various policies pursued by the authorities which determine the response of the labor market to macroeconomic shocks. Clearly, if the labor market had been perfectly flexible--except perhaps for purely frictional unemployment--then one would have expected unemployment to be less persistent than the macroeconomic shocks that are affecting it. But the institutional and policy framework of Italian labor markets is far from being perfectly flexible: the recent OECD jobs study (1994), as well as Demekas (1994), judge the Italian labor market to be one of the least flexible in Europe. <sup>1/</sup> To facilitate discussion and later econometric work, Appendix I provides a table of labor market and institutional and policy events for Italy.

In entering the 1970s, the Italian labor market already had an institutional and legal structure that significantly inhibited flexibility. Hiring by nonagricultural firms was required to come from a "public list", maintained by public employment agencies with a monopoly on employment services. The rank order of employees to be hired was determined by the state, taking into account factors such as status of employment, duration of unemployment and social factors, such as the number of dependents. Wage indexation, the so called "*scala mobile*", had already evolved to a national system of uniform adjustments based on a specially calculated index (the "*indice sindacale*"). Worker unrest during the fall of 1969 (the "hot autumn") led to legislation (the Charter of Workers Rights, or "*Statuto dei Lavoratori*") which further expanded employment regulations, while law 300/1970 gave special privileges to the largest three national trade unions. These reforms, together with the already significant dominance of the national trade unions, resulted in a centralized wage bargaining system whereby national wage agreements would be negotiated at 3-year intervals: in general, longer contracts tend to result in more persistence and longer adjustment lags. The 1970 and 1973 bargaining sessions resulted in wage increases that some observers characterized as "huge". Firing workers was costly not only because of strong legal protection accorded employees and the presence of implicit contracts with them, but also because of a system of severance pay whereby wage deductions from employees were used to finance a severance pay fund which entitled employees to automatic severance payments upon termination of employment. Another institution peculiar to Italy was the wage supplementation fund (WSF, or "*Cassa Integrazione Guadagni*"). Industrial workers that would normally be laid off would instead receive 80 percent of their wages from the WSF, almost entirely paid for by the state. Since official Italian unemployment statistics exclude these workers, all data used in this paper (in text, charts and model estimation/simulation, except where otherwise indicated) have been adjusted to include them.

---

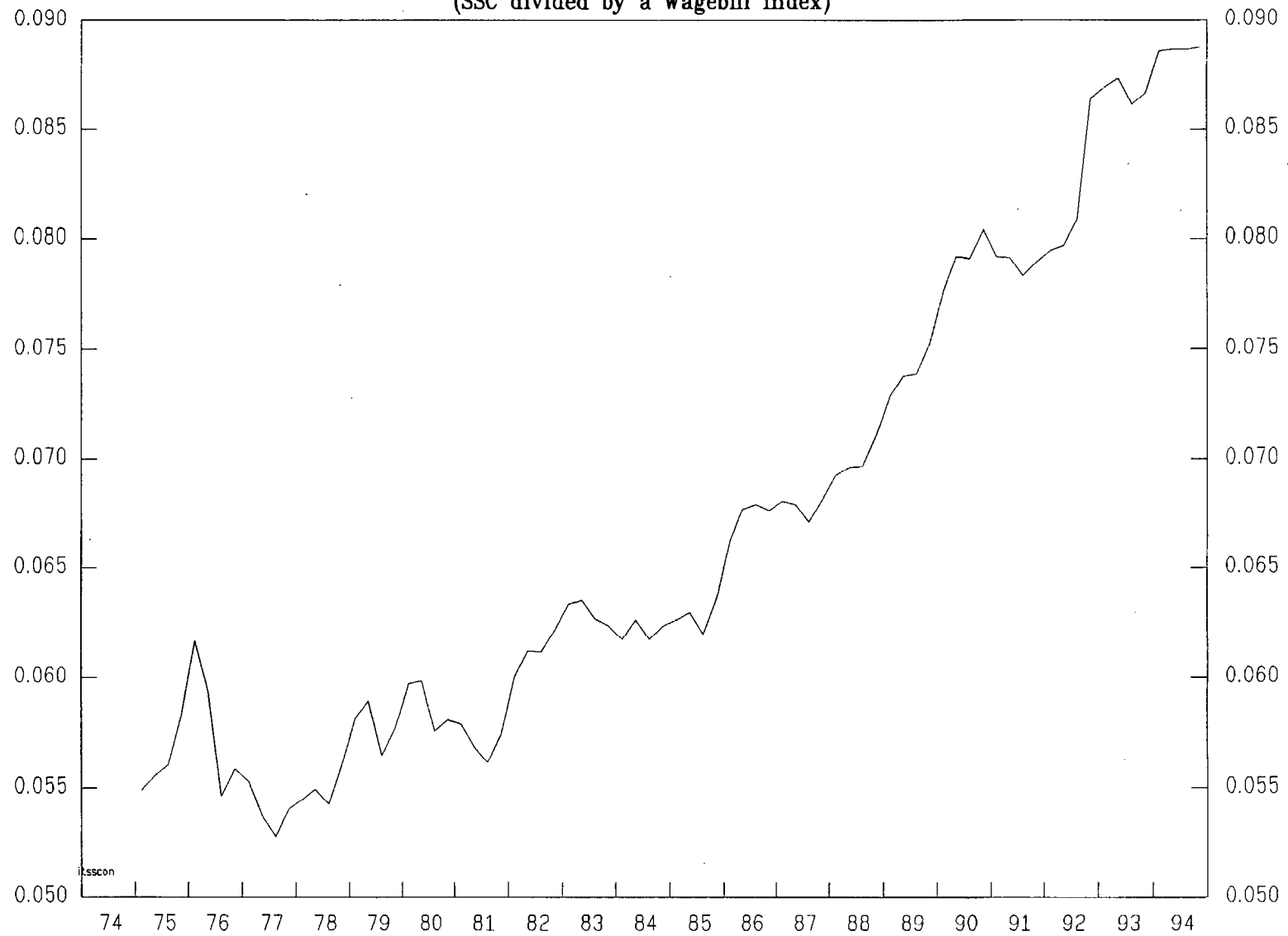
<sup>1/</sup> The OECD jobs study (1994) and Demekas (1994) provide a wealth of additional institutional detail on the Italian labor market.



Chart 5

ITALY

**Social Security Contribution Index**  
(SSC divided by a wagebill index)



Sources: Italian authorities and Fund staff estimates.

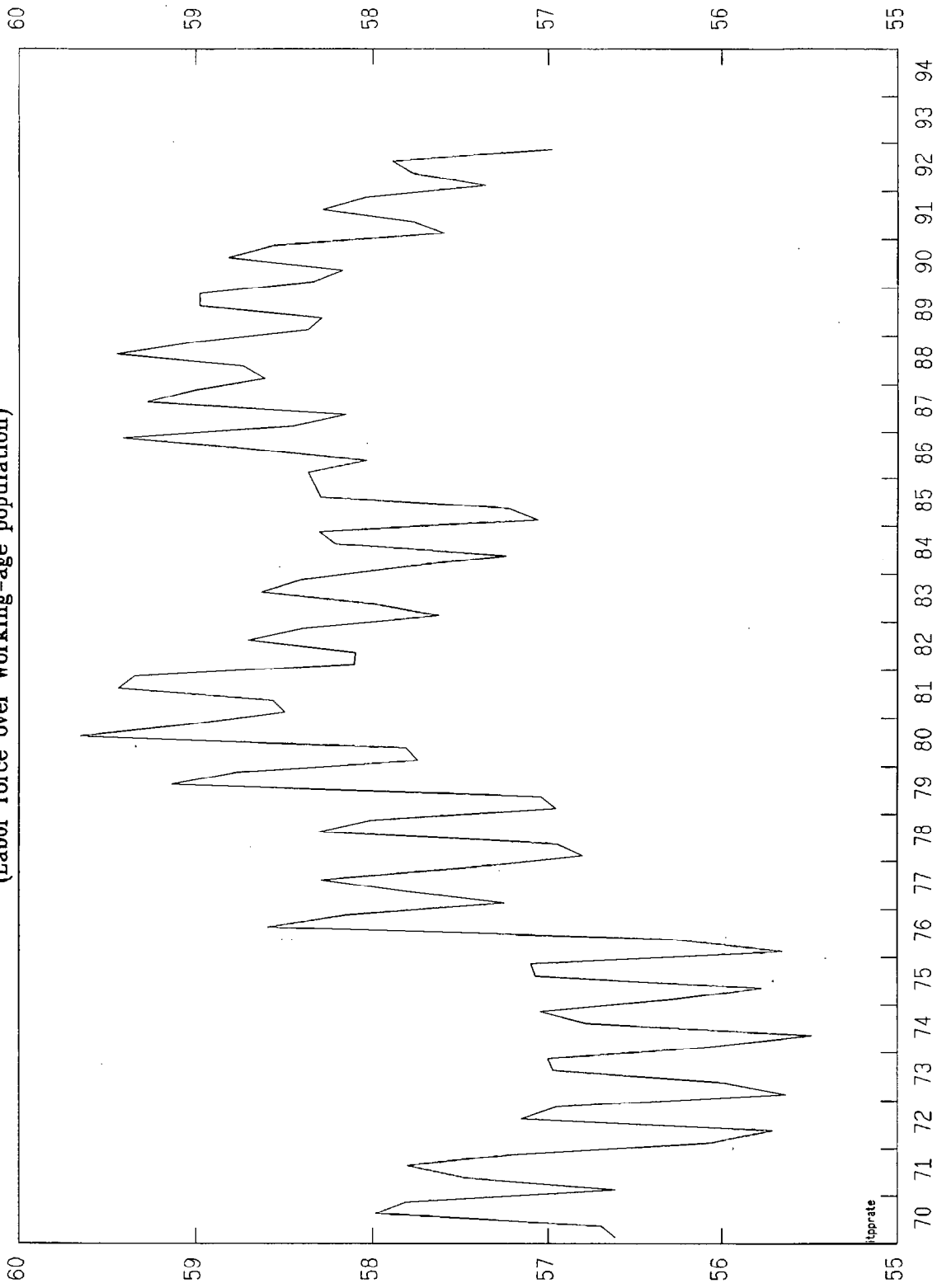


Chart 6

ITALY

# Participation Rate

(Labor force over working-age population)



Sources: Italian authorities and Fund staff estimates.



In the period prior to the first oil shock, labor market restrictions did not appear especially detrimental, as unemployment remained low because of the favorable macroeconomic conditions. However, unemployment began to rise after the first oil shock when macroeconomic conditions became less favorable (GDP growth and capital accumulation slowed, while import prices grew faster than domestic prices), suggesting that labor market inflexibility was indeed costly. Despite the persistent rise in unemployment, labor market participants continued to seek--and achieved--further changes in labor market institutions which resulted in even greater inflexibility. A 1975 agreement between trade unions and Confindustria (the main national employers' association) which was fully implemented by 1977 increased the coverage of the *scala mobile* to agricultural and service agreements (previously it applied mainly to industrial northern regions); it also increased the frequency of indexation by adjusting wages on a quarterly basis. The increase in indexation implied by these changes was a reaction to the increasing inflation, yet it also contributed to a nominal inertia in wages which raised the costs of disinflation. This would become apparent after 1981. Another important effect of the increase in coverage of the *scala mobile* was a reduction in wage differentials, both between industries and between regions. As already mentioned, this tended to disproportionately penalize employment in the south, where productivity was relatively lower. <sup>1/</sup> Wage differentials, as measured by the coefficient of variation of inter-industry wages, fell from about 23 percent in 1970 to about 16 percent in 1975 and 11 percent in 1977. Compared with other countries, Italy went from a position of relatively high wage differentials (above Germany, France and the United States and below Japan) to a position of very low wage differentials (lower than all the aforementioned countries). <sup>2/</sup>

In the period 1977-83, unemployment continued to rise, and the authorities attempted without much success to introduce reforms in the labor market. Trade unions generally resisted, and resulting reforms were of a piecemeal and contradictory character. For example, the 1979 wage agreement indicated that more wage differentiation would be allowed in the next wage agreement: this might be taken as a sign of progress. However, the 1982 wage bargaining session failed to be concluded because of a stalemate on reform proposals for the *scala mobile* and wage increases, and wage differentials remained at the same low levels between 1981 and 1984. <sup>3/</sup> In 1980, the maximum payout from the WSF was increased in nominal terms for salaried employees, although average coverage fell somewhat from 80 percent to 76 percent. The severance pay system was somewhat relaxed by reducing the constant of proportionality for payments into the severance pay funds to less than 100 percent, but the *scala mobile* wage component was now included in the bases. In general, during this period there were complicated changes at the margin which were the result of compromise and did not address any of the fundamental institutional issues and policies.

---

<sup>1/</sup> See also IMF (1986), "Labor Market Flexibility," SM/86/135 (6/17/86).

<sup>2/</sup> See SM/86/135, already cited.

<sup>3/</sup> See de Luca and Bruni (1994), Fig. 17, p.77.



In 1983-84, there was a more serious attempt to deal with the *scala mobile*. The 1983 wage bargaining agreement reduced the effective degree of indexation by 15 percent, while a "once-off" reform to incomes policy was introduced in 1984 which limited the *scala mobile* points that were allowed to be counted for wage indexation purposes. These reforms had some success in reducing overall wage indexation, as measured by the average degree of coverage in the manufacturing sector. This measure declined from over 70 percent in 1982 to around 60 percent (with some fluctuations) in the period 1983 to 1991. 1/ In the area of hiring and firing regulations, some slight progress was made in 1984, as employers were allowed to hire a limited number of workers without regard to the rank order contained in the public list. Some improvement was also made regarding the "internal flexibility" of firms--the ability of firms to internally reorganize--by introducing "solidarity contracts" which would let workers in firms with more than 1,000 employees to share the work. These contracts were apparently only lightly used, however.

Labor market reform did not begin in earnest until 1991-92, when continuing high unemployment finally resulted in a political consensus sufficiently strong to put in place a number of very important reforms aiming to remove some of the impediments to labor market flexibility. In the area of hiring/firing regulations, the long-standing system regulating the rank order of hires was abolished in 1991. Some exceptions remained for the disabled and the disadvantaged (i.e., the long-term unemployed). In addition, firms were allowed to place workers unemployed because of mass layoffs on a "mobility" list rather than on the WSF. Although the benefits received were approximately equivalent between the mobility list and the WSF, and workers on the mobility list are supposed to receive priority in hiring, the effective employment protection accorded workers on the mobility list was substantially reduced relative to the protection enjoyed under the WSF. The 1991 wage accord suspended wage indexation, and the 1992 *scala mobile* adjustment was suspended. By 1993, the *scala mobile* was also definitively abolished and the wage bargaining system was reformed. Two levels of wage-bargaining were defined (national/sectoral, and regional/firm) which were to take into account national benchmarks based on targeted inflation. Labor contracts would now be 4-yearly although nominal wages would be renegotiated every two years.

The effect of these policies was to somewhat improve wage flexibility but, more importantly in the Italian context, to improve the ability of firms to hire and fire. The recession, which began at end-1991, also resulted in unprecedented shakeout in services (including the public sector). Unlike in previous recessions, employment in the services sector declined. 2/ The result of these changes was an unprecedented decline in employment and an increase in unemployment by about 2 percent. Comparing the behavior of employment during the most recent recession to that of

---

1/ See de Luca and Bruni (1994), Fig.12, p.63.

2/ See also IMF, "Unemployment," Annex II, in Italy - Background Economic Developments and Issues, SM/95/48 (3/9/95).



earlier recessions shows that employment was much more cyclical/responsive to output than before (Chart 13). Clearly, firms used the opportunity of lower firing restrictions to restructure, and productivity increased substantially as a result (which is atypical for an Italian recession). The difficult question must be whether firms will prove equally flexible in hiring people during the upswing. This question will be taken up in a later section.

Finally, it is also worth mentioning that a number of policies that are often important when considering the unemployment experience of other countries have not played an important role in Italy. Minimum wage legislation, for instance, does not exist at the national level. Unemployment benefits have also been relatively unimportant, with a replacement ratio at 10 percent throughout most of the period under review. However, it should be noted that the WSF in large part substituted for the absence of a more typical system of unemployment benefits, which is why this paper utilizes labor market figures adjusted for the WSF. <sup>1/</sup> In addition, the Italian authorities have recently increased the replacement ratio to 25 percent.

### 3. A model-based analysis of historical developments

The analysis presented in the earlier section was suggestive of the causes of unemployment in Italy but, in the absence of a quantified framework, it is not possible to pinpoint the relative importance of the various factors or the time scale over which they operate. In this section two structural VAR models of the labor market in Italy are estimated based on quarterly data available as of April 1995, for the period 1977-94. The first model will be referred to as the "basic" model. It will be used to calculate measures of persistence and imperfect responsiveness as discussed further below. The second model will be an expanded, 11-equation version of the basic VAR model. The added equations are simple autoregressions for the exogenous variables in the basic VAR (so that the additional equations in the 11-equation VAR remain block-exogenous to the basic set of equations). The purpose of the expansion is to be able to perform a variance decomposition for unemployment (also for employment, real wages and labor force) which includes the exogenous variables.

The basic VAR consists of three behavioral equations, shown below:

- (1)  $n_t = f_n(t) + a_{nn}(L)n_{t-1} + a_{nw}w_{pt} + a_{nk}k_t + a_{nr}r_t + a_{ny}y_t + a_{ns}(L)SSC_t$
- (2)  $wc_t = f_w(t) + a_{wn}(L)n_{t-1} + a_{ww}wc_{t-1} + a_{wp}p_t + a_{ws}(L)SSC_t$
- (3)  $l_t = f_l(t) + a_{ln}(L)n_t + a_{ll}(L)l_{t-1} + a_{lw}wc_t + a_{la}WAP_t$

---

<sup>1/</sup> In addition, the replacement rate applicable to the WSF has varied very little throughout the sample period.



where  $n$  denotes employment,  $w_c$  the consumption wage,  $w_p$  the product wage,  $l$  the labor force,  $k$  business sector capital stock,  $r$  competitiveness,  $y$  real GDP,  $p$  productivity,  $WAP$  the working age (14-64) population and  $SSC$  the ratio of social security contributions to the wage bill (in index form).  $L$  denotes the lag operator (for any time series  $x_t$ ,  $Lx_t = x_{t-1}$ ),  $a(L)$  a polynomial in the lag operator and  $f(t)$  a deterministic function which includes a constant, a time trend and quarterly dummies, since all data are seasonally unadjusted. All variables, except  $SSC$ , are measured in logarithms. Appendix II provides further details on data sources and definitions.

Equation (1) is an employment equation (which may be interpreted as a labor demand equation), equation (2) a wage-setting equation and equation (3) a labor-force (participation, or labor-supply) equation. The unemployment rate is then determined as a log-linear approximation to the identity linking unemployment, employment and the labor force ( $u_t = l_t - n_t$ ). Because the appropriate wage concept for the labor demand equation is the product wage, but for the wage-setting/labor supply equation it is the consumption wage, an additional equation is appended for the product wage (in effect, capturing the wedge, which is shown on Chart 7). For the work reported in this section, the product wage is computed as an identity utilizing the within-sample wedge together with the simulated consumption wage.

In choosing the specifications included in equations (1)-(3), a number of alternatives were considered, especially regarding which explanatory variables to include and whether to use the unemployment rate directly rather than employment and/or the labor force. Criteria for inclusion consisted not only of the statistical significance of the coefficients, but also of the overall fit of the system and its dynamic properties. Variables such as oil prices and direct tax rates were not statistically significant in the employment equation, whereas unemployment was not significant. The labor force participation equation also tended to have worse autocorrelation properties when unemployment was utilized instead of employment and lagged labor force. <sup>1/</sup>

---

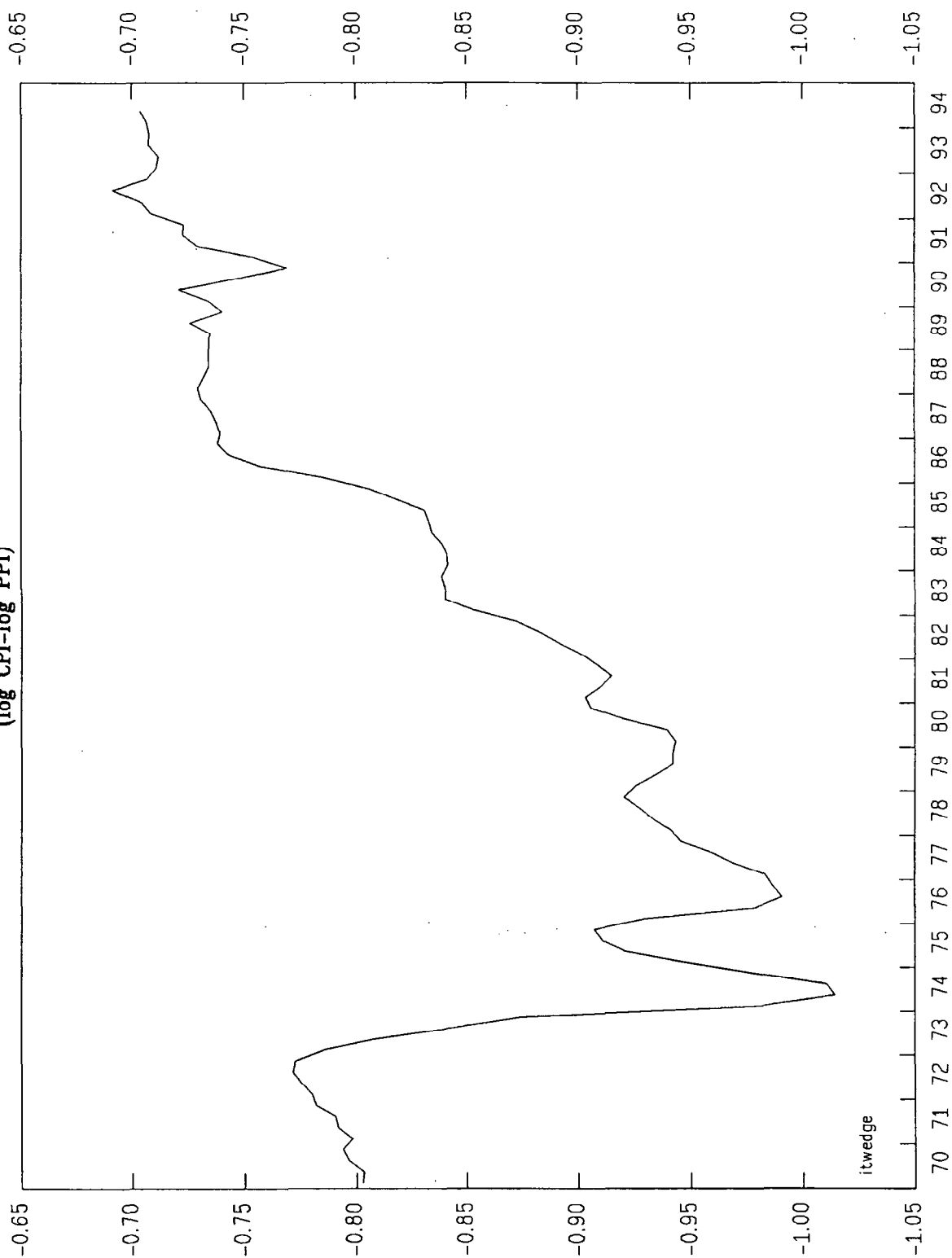
<sup>1/</sup> Appendix III provides more detail regarding the estimation methods used as well as further diagnostic tests. The nonstationarity of the variables requires that the estimated relationships be tested for cointegration. This was done, and all the relationships reported here pass this test: this implies that the coefficients are estimated consistently. The nonstationarity of the variables could raise some concerns regarding the correctness of the estimated standard errors, however. A monte-carlo simulation study was performed, the results of which are included in Appendix IV. It was found that the regression-based  $t$ -statistics were close to the simulated  $t$ -statistics. Thus, the conclusions reported in the text were not significantly affected by the nonstationarity of the variables.



Chart No. 7

ITALY

**Wedge**  
(log CPI-log PPI)



Sources: Italian authorities and Fund staff estimates.







The tabulation below summarizes the best specification achieved for each equation. In the employment equation the coefficients on the explanatory variables have the expected signs. According to the results, increases in the product wage decrease employment, as do unfavorable competitiveness shocks and increases in social security contributions. <sup>1/</sup> They show that faster capital stock accumulation and GDP growth increase employment. The inclusion of GDP in the employment equation requires some explanation because according to the standard competitive model of the firm, output does not enter the factor demand equation (although it does enter the conditional factor demand equation, in which case capital does not enter; see Varian (1984), Section 1.7). One interpretation is that the model of the firm that is implicitly underlying the employment equation considered here is one of imperfect competition. As in Layard and Nickell (1987), an activity variable (or, in their model, an expected activity variable, which could be proxied by contemporaneous or lagged GDP) plays a role in a nonperfectly competitive firm which chooses prices, output and employment based on its expectation of activity.

---

<sup>1/</sup> Because of data unavailability of social security contributions decomposed by employer and employee, the SSC variable is an imperfect proxy. Nevertheless, it appears that SSC approximates the employer contribution portion of social security contributions closely enough to allow the negative coefficient on this variable to be measured sufficiently precisely.



# Regression Results, Basic VAR

Dependent variable	$n_t$		$wc_t$		$l_t$	
<u>Summary statistics</u>						
R-bar squared	0.944		0.972		0.977	
S.E., dependent variable	0.020		0.033		0.034	
S.E., estimate	0.005		0.006		0.005	
Durbin-Watson statistic	2.004		2.084		1.806	
Q-Statistic, (significance)	0.626		0.568		0.512	
<u>Coefficients</u> (t-statistics without regard to sign)						
Constant	-7.91	(4.4)	-1.96	(3.3)	0.45	(0.8)
Trend	-0.004	(3.9)	--	(0.2)	-0.0003	(2.3)
2nd quarter dummy variable	0.007	(2.8)	-0.004	(1.8)	-0.006	(2.1)
3rd quarter dummy variable	0.016	(8.7)	-0.001	(0.6)	-0.011	(3.0)
4th quarter dummy variable	0.009	(6.0)	-0.005	(2.7)	-0.006	(2.0)
$n_t$	...		...		0.952	(10.5)
$n_{t-1}$	0.556	(6.6)	...		-0.505	(3.1)
$n_{t-2}$	...		...		-0.434	(2.6)
$n_{t-3}$	0.145	(1.9)	0.187	(3.3)	0.217	(1.2)
$n_{t-4}$	...		...		-0.147	(1.0)
$wc_t$	...		...		0.007	(1.7)
$wc_{t-1}$	...		0.77	(17.7)	...	
$l_{t-1}$	...		...		0.664	(5.8)
$l_{t-2}$	...		...		0.103	(0.7)
$l_{t-3}$	...		...		-0.183	(1.4)
$l_{t-4}$	...		...		0.272	(2.5)
$wp_t$	0.12	(3.2)	...		...	
$k_t$	0.66	(4.0)	...		...	
$r_t$	-0.07	(5.0)	...		...	
$y_t$	0.158	(5.4)	...		...	
$p_t$	...		0.05	(1.1)	...	
$WAP_t$	...		...		0.00001	(1.8)
$SSC_t$	-4.49	(7.1)	-4.68	(6.5)	...	
$SSC_{t-1}$	3.76	(5.1)	4.54	(5.0)	...	
$SSC_{t-3}$	-1.44	(3.7)	0.03	(0.1)	...	

Notes:  $n$  denotes employment,  $wc$  the consumption wage,  $wp$  the product wage,  $l$  the labor force,  $k$  business sector capital stock,  $r$  competitiveness,  $y$  real GDP,  $p$  productivity,  $WAP$  the working age (14-64) population and  $SSC$  the ratio of social security contributions to the wage bill (in index form). All variables, except  $SSC$ , are measured in logarithms. Appendix II provides further details on data sources and definitions.



The phenomenon of labor hoarding (whereby the firm hoards labor in anticipation of increases in activity, which again is signalled by increases in contemporaneous activity) is an instance of this. The results show that employment appears strongly correlated with output and has an implicit coefficient of 1.9, a reasonable number. <sup>1/</sup> In the short-run, however, the estimated responsiveness of employment to output is very low, which also corresponds to conventional wisdom.

Interestingly, after accounting for the effects of the explanatory variables, there remains a statistically significant trend decline in employment. This could be the result of an omitted, and as yet unidentified, explanatory variable. Alternatively, it could indicate the effect of a continuous introduction of labor saving technology. Regarding lagged effects, significant lagged employment effects are estimated, which are normally interpreted as capturing employment adjustment costs. Social security contributions also affect employment negatively overall, with a lag pattern which is related to employment adjustment costs: not all of the adjustment to a change in social security contribution rates can take place immediately.

For the wage equation it proved difficult to obtain significant and plausible effects from a set of potential explanatory variables. Unemployment, either contemporaneously or with a lag, appears to affect consumption wages only weakly and the results indicated that it could be dropped from the final specification. This points either to significant insider power (since insiders are able to insulate themselves from market forces in the wage setting process) or to a weak effect of the excess supply of labor on wage settlements (a Phillips curve effect). It will be seen that this effect is actually strong in the case of Italy, but it operates through the participation rate rather than through wages. Productivity affects wages positively, but appears not statistically significant. This may be partly a result of the fact that the productivity variable has been smoothed by applying a centered 5-quarter moving average filter, which may be too short to smooth out cyclical movements in productivity (a nonsmoothed productivity variable indicated similar results). However, other researchers have also noted the lack of a strong relation between real wages and productivity. <sup>2/</sup> The social security contribution variable also does little, and there is no residual trend movement in wages. Direct taxes also proved insignificant.

Most of the important effects in the wage equation are lagged effects. There is a significant lagged real wage coefficient, which can be theoretically linked to wage staggering effects. Because of the operation

---

<sup>1/</sup> Lindbeck and Snower (1994) explore the issue of the transmission of demand changes to the labor market in greater detail. Snower, especially, has argued that the effects of GDP on employment should be small, or that the model should be expanded to incorporate nominal effects. This suggestion is not being pursued here.

<sup>2/</sup> See de Luca and Bruni (1994), pp.69-71.



of the *scala mobile* in Italy throughout almost all of the sample period, one would expect strong wage staggering effects, which indeed are shown to exist. The other interesting lag effect is the statistically and economically significant 3-quarter lagged effect of employment on wages, which can be interpreted as the "insider employment" effect. Recalling the earlier discussion of hiring and firing rigidities, it can be inferred that insiders will have unusually strong bargaining position in the Italian labor market. This means that as employment increases, so does the strength of insiders, perhaps after some lag before the new insiders become fully entrenched. According to the estimated effect, a 10 percent increase in employment results in an almost 2 percent increase in real wages after 3 quarters. Overall, the results for the wage equation are consistent with the conventional description of wage-bargaining in Italy: namely, centralized trade unions negotiated with centralized employers under conditions which have in the past tended to favor insiders and resulted in wage bargains which did not take into account market conditions.

The labor force equation is notable for the strength of the discouraged worker effect. Variations in employment appear to cause significant variations in labor force participation: the long-run elasticity of the labor force with respect to employment is 0.576. Clearly, these results suggest that a significant part of labor market clearing takes place through variations in labor supply. Consequently, the unemployment series underestimates the amount of excess capacity in the labor market in the aftermath of a recession. There are also considerable labor force adjustment effects apparent in the equation, with significant lags for both employment and the labor force. The working age population variable appears to be only borderline significant; this may be because the relatively large shifts in labor participation caused by female entrants into the labor force--which are unrelated to the increase in working age population--are masking its effect. Nevertheless, the coefficient has the correct sign. The consumption wage has the expected positive effect on labor participation, although its statistical significance is borderline. Finally, there remains a statistically significant residual trend reduction in the labor force: this may be related either to an omitted variable or to the reduction in the male participation rate noted earlier.

Perhaps more interesting than the individual equation results is the way that the equations interact in a system context. VARs were in fact emphasized by, e.g., Sims (1980) with a view to examining cross-equation effects and dynamic impulses. However, VARS also raise some difficult issues of interpretation. One important issue is the identification problem, which stems from the fact that in general the VAR covariance matrix is nondiagonal (so that the shocks to the individual equations tend to be contemporaneously correlated) and a unique method for "diagonalizing" a general VAR is not available. Typically, researchers using VARs either accept them as "atheoretical", which means that they are meant to capture generic dynamic responses that may not correspond to easily understood economic shocks (e.g., demand or supply) or as "structural", which pin down the sources of shocks utilizing some identifying restrictions. A good example is the analysis of demand and supply shocks by Blanchard and Quah



(1989). These researchers were able to identify the demand and supply shocks by a priori imposing a restriction on the lag structure of the moving average representation of the VAR (they assumed that the demand shock had a purely temporary effect, so that the long-run response of the VAR to a demand shock was zero, while a supply shock had a permanent effect). However, in this project the aim is to estimate the lag structure directly.

The form of the VAR estimated here is of the "structural" type: the case partly rests on theoretical grounds, which provide guidance as to which variables to include in a labor demand or supply equation (Henry and Snower (1995)). However, the possibility remains that because of data limitations, or an unsuccessful specification, the estimated VAR will not possess the requisite properties. Two such pieces of evidence support the structural interpretation of the estimated VAR for Italy. First, the estimated covariance matrix for the VAR is near-diagonal (see the tabulation for the expanded version of the VAR further below), indicating that contemporaneous covariances between the endogenous variables are successfully captured by the VAR specification and obviates the need for complicated--and possibly unfounded--identifying assumptions. Second, the impulse responses of shocks to the employment equation are damped and the long-run response of employment to a temporary shock on employment is zero (Charts 8-9), as would be expected if the employment equation corresponded to a demand equation.

Correlation Matrix of Residuals, 11-equation System

	$wc_t$	$l_t$	$u_t$	$wp_t$	$k_t$	$WAP_t$	$y_t$	$r_t$	$SSC_t$	$p_t$
$n_t$	-0.20	-0.29	-0.16	0.11	-0.01	-0.00	-0.02	-0.11	-0.01	-0.02
$wc_t$		-0.15	0.06	0.35	-0.08	0.07	0.12	0.01	-0.01	0.19
$l_t$			0.11	0.28	-0.06	0.19	-0.13	-0.08	-0.57	0.19
$u_t$				-0.08	0.06	-0.15	0.26	-0.18	-0.06	
$wp_t$					-0.08	0.37	-0.08	-0.49	-0.49	0.05
$k_t$						-0.25	0.13	0.01	0.14	-0.02
$WAP_t$							0.16	-0.49	-0.21	-0.04
$y_t$								-0.09	0.01	0.13
$r_t$									-0.03	0.06
$SSC_t$										-0.22

Notes: n denotes employment, wc the consumption wage, wp the product wage, l the labor force, u unemployment, k business sector capital stock, r competitiveness, y real GDP, p productivity, WAP the working age (14-64) population and SSC the ratio of social security contributions to the wage bill (in index form). All variables, except SSC and u, are measured in logarithms. Appendix II provides further details on data sources and definitions. The covariance matrix is estimated from an extended 11-equation VAR.

The covariance matrix elements (in fact, reported as correlations) are in almost all cases fairly small, and we do not view a correlation of -0.49 between working age population and competitiveness as signifying substantial misspecification. A few exceptions should be mentioned that may not represent sampling error; these include a negative residual correlation between the product wage and social security contributions and



competitiveness, a negative correlation between the labor force and social security contributions, and an apparently strongly negative correlation of -0.72 between unemployment and capital stock. But, overall, most of the correlations reported appear small enough to justify the characterization of the covariance matrix as "near diagonal".

To further check the results of the estimated VAR, its out of sample forecasting performance was examined and dynamic simulations were performed. The out of sample forecasting performance was examined systematically by calculating the root-mean squared error (RMS) statistic and the Theil U statistic over different forecast steps: the results are collected in the tabulation below. The dynamic performance of the model can be seen in the simulations presented in Charts 10 and 11. Generally, the model has good out of sample forecasting properties, with RMS increasing only gradually as the forecasting horizon increases. The calculated Theil U statistics, which are well below 1.0, indicate that the basic model easily outperforms a "naive" random walk model. The dynamic simulations (which will be discussed more fully in a later section) also seem to indicate that the model tracks well within sample and forecasts reasonably out of sample. Appendix III provides further tests of the statistical adequacy of the model.

Theil U Statistic and RMS Error (in parenthesis)

Variable	1-step ahead	4-step ahead	8-step ahead	12-step ahead
$n_t$	0.20 (0.003)	0.08 (0.002)	0.07 (0.004)	0.11 (0.008)
$wc_t$	0.65 (0.004)	0.55 (0.006)	0.01 (0.0001)	0.07 (0.001)
$l_t$	0.02 (0.0002)	0.41 (0.016)	0.12 (0.006)	0.12 (0.007)
$u_t$	0.17 (0.001)	1.11 (0.012)	0.25 (0.001)	0.10 (0.002)

Notes:  $n$  denotes employment,  $wc$  the consumption wage,  $l$  the labor force and  $u$  the unemployment rate. The Theil U statistic computes the ratio of the forecast error to the forecast error obtained by a random walk model in each variable.

Given that the model adequately captures some of the dynamic interrelationships that seem important for the Italian labor market, it is possible to use the model to gain a quantitative understanding of the sources of unemployment. The main tool will be a variance decomposition for unemployment utilizing the extended version of the model. Although this method has the disadvantage (when compared with the direct measures of persistence and imperfect responsiveness to be provided below) of not disentangling the lagged effects from the effects of exogenous variables, it nevertheless is a convenient way to characterize the "gross" sources of unemployment. The variance decomposition is a way of determining the fraction of the innovations in employment, real wages, labor force and unemployment explained by each endogenous variable in the model. To implement this, it is required that the variables that appeared as exogenous



in the basic model be endogeneized. This is accomplished by appending autoregressions for the exogenous variables to the basic model and re-estimating the extended model (in effect, the additional variables are treated as being block-exogenous). The results of the variance decomposition in the short-run (1-step ahead) and in the medium- to long-run (24-step ahead, or six years) are collected in the tabulation below.

### Variance Decomposition, 11-equation Model

(1-step ahead; 24-step ahead in parentheses; in percent)

Explanatory variable	$n_t$	$wc_t$	$l_t$	$u_t$	$wp_t$
$n_t$	62 (8)	2 (2)	10 (2)	20 (13)	1 (1)
$wc_t$	1 (3)	65 (22)	3 (2)	1 (2)	16 (18)
$l_t$	8 (2)	13 (5)	73 (32)	73 (68)	19 (0)
$u_t$	0 (0)	0 (0)	0 (0)	2 (0)	0 (0)
$wp_t$	1 (1)	2 (1)	1 (1)	0 (1)	64 (58)
$k_t$	1 (23)	0 (16)	0 (14)	3 (5)	0 (1)
$WAP_t$	2 (10)	0 (8)	2 (13)	0 (4)	0 (0)
$y_t$	8 (32)	0 (24)	4 (22)	0 (4)	0 (1)
$r_t$	0 (9)	3 (12)	0 (5)	0 (2)	0 (1)
$SSC_t$	16 (12)	13 (9)	8 (9)	0 (1)	0 (0)
$p_t$	0 (0)	0 (2)	0 (0)	0 (0)	0 (0)

Notes: n denotes employment, wc the consumption wage, wp the product wage, l the labor force, k business sector capital stock, r competitiveness, y real GDP, p productivity, WAP the working age (14-64) population and SSC the ratio of social security contributions to the wage bill (in index form). All variables, except SSC, are measured in logarithms. Appendix II provides further details on data sources and definitions.

A number of results become apparent. Unemployment is significantly affected by changes in the labor force (in fact labor force appears to dominate employment), a result that holds both in the short- and long-run. This result seems plausible for Italy, given the large exogenous changes in the participation rate over the sample period; it may be less significant for other countries. <sup>1/</sup> In the short-run, all series are dominated by their own innovations. However, in the long-run, the labor force retains about 33 percent explanatory power, the consumption wage about 20 percent while employment shocks become negligible. This is of course consistent

<sup>1/</sup> Layard and Nickell (1987), for example, report that labor force movements were relatively unimportant in explaining U.K. unemployment.



with the interpretation that employment represents short-run demand by firms while wage setting and labor force participation represent supply-side effects, which are expected to persist in the long run--as argued, for example, by Blanchard and Quah (1989). The product wage seems to behave differently, retaining a 20 percent long-run effect from the consumption wage, but a 60 percent effect from its own innovations. This surprising result is probably related to the rather persistent behavior of the wedge over the sample period (Chart 7).

One result with far-reaching implications, however, is that variables treated as exogenous in the extended model (capital, GDP, working-age population and competitiveness) ultimately become predominant, explaining 64 percent of employment, 60 percent of the consumption wage, and 54 percent of the labor force variance in the long-run. This result is consistent with a view that attributes much of the rise in unemployment to the weak macroeconomic performance of the Italian economy together with unfavorable external shocks. However, it must be kept in mind that the impact of the unfavorable macroeconomic environment was magnified and sustained by the inflexibility of Italian labor market institutions, which kept real wages high and impeded the entry into jobs of the new entrants into the labor force.

Another significant result is the effect of the increases of the social security contributions over the sample period. By itself, this variable explained 16 percent of the variance of employment and 13 percent of the variance in the consumption wage. Perhaps more importantly, this effect largely persists into the long-run. This finding is important, however, not only because it indicates that policy did have a significant detrimental effect, but also because of the statistical properties of a policy variable that it implies. Social security contribution is a persistent variable--it is  $I(1)$ . Thus, to the extent that the statistical properties of social security contributions are representative for other policy variables, this means that the effects of policy (both detrimental and favorable) can be more powerful and long-lasting.

#### 4. Evidence on labor market policies and lagged effects

In the framework adopted in this paper, policy can have three distinct roles. One, it can affect unemployment directly (example: social security contributions, which were shown to reduce employment both in the short- and in the long-run). Two, it can affect unemployment indirectly, by influencing variables that were considered as exogenous from the point of view of the model (example: GDP growth, capital formation and competitiveness). Three, it can affect the lags with which both policy and nonpolicy variables affect unemployment, an area of particular importance under the KS framework (examples: social security contributions affect employment both contemporaneously and with a lag; the *scala mobile* resulted in more rigid wages and a longer wage-adjustment lag; firing costs resulted in longer employment-adjustment lags). Each will be discussed in turn.



The direct effects of policy on unemployment are the simplest to describe. As already shown, social security contributions increased the cost of employment to employers and introduced a wedge between the value of work to employees. The overall impact on employment and wages was significant and persistent, as shown by the variance decomposition. The reason for the continuous rise in social security contributions is probably related to two factors: demographics (Italy has one of the highest old age dependency ratios in the OECD), and increasing spending on pensions, which grew from some 5 percent of GDP in the 1960s to more than 15 percent in the 1990s. Compared with other countries, Italian spending on pensions started close to the G-7 average in the 1960s, but increased to the highest in the OECD (except Austria) by the 1990s. Although the increase in pensions is partly related to demographics, the generosity of the Italian pension system is also responsible: compared with EU countries, Italy pays the highest old-age pension benefits when they are expressed as a ratio to per capita GDP. 1/

The indirect effects of policy on unemployment, which operate through such variables as GDP, capital accumulation, and competitiveness, are harder to pin down because they touch upon a number of difficult macroeconomic issues that cannot be analytically resolved in the absence of a fully specified macroeconomic model. 2/ However, a number of comments can be made. Demand management policies were already shown to be ineffective after the first oil shock. Academics and policy makers alike no longer believe that it is possible for the authorities to raise GDP (or capital accumulation) in a sustained fashion through demand management policies. 3/ However, structural policies can influence GDP and capital accumulation. Two such sets of policies which overall could be expected to have detrimental effects on GDP and capital accumulation can be mentioned in the case of Italy. The first concerns regional policies vis-à-vis the South, while the second concerns the net effect of overall revenue and expenditure policies--the continuing accumulation of a large stock of public debt.

In the 1960s and 1970s, regional development in the South was predominantly attempted through the installation of capital intensive

---

1/ See Canziani and Demekas (1995).

2/ The adverse movements in competitiveness for Italy were reversed after 1984, so they no longer represent an important impediment in employment creation.

3/ Modigliani, Padoa Schioppa and Rossi (1987) argue that unemployment in Italy can be primarily traced to two factors: real wage rigidity and an inability to raise aggregate demand on account of leakages--in effect, an external constraint. They argue that what is required is a coordinated increase in aggregate demand by industrial countries. Of course, this begs the question on whether demand policies can affect output in a sustained fashion, which is valid regardless of the presence or absence of coordination (although the presence of an external constraint does tend to make the deficiencies of demand management policies obvious faster).



industrial enterprises, which were at the time expected to contribute to employment through linkages with other sectors. <sup>1/</sup> This policy, by effectively subsidizing capital intensive activities at the expense of relatively abundant labor, had precisely the opposite effect from what was intended. (Another way of describing the effect of the policy is that for a given level of investment relatively fewer jobs were created). In addition, the South was granted good access to public sector employment but wages were set in a centralized fashion without adjusting for local conditions (e.g., cost of living, local wages or unemployment). As previously discussed, this was exacerbated by the effect of centralized bargaining and wage setting even for private industry. The overall effect was to raise wages for the whole region well above market clearing levels.

The other major policy influence on both GDP and capital accumulation is without a doubt the continuing accumulation of public debt, which raised long-term real interest rates. Although this point tended to be challenged by academics, recent evidence suggests that the levels of public debt have risen throughout the industrialized world, and that this has had statistically and economically significant effects on real interest rates. <sup>2/</sup> In addition, Italian public debt has risen faster than in the rest of the EU, and real interest rate differentials between Italy and Germany are wider. Clearly, this will continue to depress capital formation until the level of public debt is brought down.

The third way in which policy in Italy affected unemployment is through its influence on the delay with which both policy and nonpolicy variables affect unemployment. These lags have received special attention in this study. Italy appears to exhibit a full complement of these effects: an employment adjustment effect (lagged employment in the employment equation), a wage staggering effect (lagged real wages in the wage-setting equation), an insider membership effect (lagged employment in the wage-setting equation), and a labor force adjustment effect (lagged labor force in the labor force equation). A fifth effect, arising from the long-term unemployed acting to discourage employment, does seem important for Italy, although there appears to be a similar effect operating through lagged employment terms in the labor force equation rather than through lagged unemployment terms in the wage-setting equation. In other words, the long-term unemployed tend to leave the labor force altogether and appear to have little effect on wages; by contrast, it is insiders who appear to have an effect on wages.

Policy in Italy has tended overall to act in a way that would be expected to magnify these lags. The main policies were described in greater detail in an earlier section. To recapitulate, wage indexation in the form of the *scala mobile* would be expected to result in more rigid wages and a longer wage-adjustment lag (a stronger wage-staggering effect); firing costs and employment protection would be expected to result in a stronger insider

---

<sup>1/</sup> See de Luca and Bruni (1993), pp.28-33.

<sup>2/</sup> See Ford and Laxton (1995).



membership effect as well as longer employment-adjustment lags; hiring costs (the requirement that hiring be done through public employment agencies in the order determined by the state) would be expected to increase employment adjustment lags, strengthen the insider membership effect and perhaps increase the discouraged worker effect.

It should be emphasized that not all of these effects would necessarily be expected to affect the average level of unemployment. The employment adjustment effect, the wage staggering effect and the labor force adjustment effect would tend to increase the lag with which unemployment adjusted after being subject to shocks, but would not of themselves increase unemployment. On the other hand, the insider membership effect, and the discouraged worker effect, can affect average unemployment, by respectively increasing real wages and by lowering the labor force. There is some theoretical controversy on whether employment protection legislation (hiring and firing costs) would be expected to affect average unemployment. Bertola (1990) constructs models which imply that the variance of employment would tend to be reduced, but average unemployment remain largely unchanged. Snower (1990), on the other hand, argues that because the bargaining power of insiders would increase in the presence of hiring and firing costs, and because the presence of insiders would tend to increase wages, average unemployment would be expected to increase.

Estimating the quantitative impact of policy on the various lag effects for Italy is complicated by a number of factors. First, it is generally impossible to measure policy directly: policy changes tended to be of a complicated, legal nature that is not amenable to direct measurement. Second, not all policies changed in a discrete manner over the sample period. Finally, when policy did change discretely, it tended to happen in a number of areas simultaneously, which complicates the interpretation of the results. Nevertheless, some estimates of the effect (or the absence thereof) did prove possible, by constructing dummy variables that captured the effect of policy changes that occurred at known times; Appendix I provides a listing of known policy changes and their timing. When these are examined, it is found that there were two potentially significant break points in the sample when policy changed: 1985, when the *scala mobile* was somewhat weakened and internal labor flexibility increased; and 1992, when the *scala mobile* was abolished, the national wage bargaining system revised, the public list system of hiring abolished and firing costs generally reduced. The effect of policy changes after 1984 is examined in this section, whereas the effect of policy changes after 1991 is examined in the next section.

A statistical investigation of coefficient stability before and after 1984 was carried out to see whether policies (or, indeed, other factors) had significant effects on labor market behavior. Given preliminary results for other countries, 1/ and some existing research results for Italy, 2/ it

---

1/ E.g., coefficients estimates for France are generally thought to contain significant breaks in early to mid-1980s.



was expected that a structural break would be found. Surprisingly, the evidence points instead to a rather impressive degree of parameter stability and a relative lack of policy-induced changes. First, F-tests of overall parameter stability were performed for each of the three equations (employment, wage-setting and labor participation). For all three equations, the hypothesis of joint parameter stability failed to be rejected at conventional significance levels. 1/ A visual examination of the residuals of each equation also failed to reveal large outliers or any other evidence of misspecification (such as heteroskedasticity, or lack of stationarity of the residuals). Then, the equations were re-estimated allowing the major policy-related coefficients to differ across the two sub-samples. 2/ The relevant results are reported in the tabulation below.

Clearly, most coefficients change remarkably little from one sub-sample to the next. The main exception is a weakening of the discouraged worker effect in the labor force equation, a change which is relatively large and approaches statistical significance. 3/ The only statistically significant change was in the first employment lag in the employment equation, but the economic significance of the magnitude of the difference was negligible. In all other cases, statistical tests failed to reject the hypothesis of individual coefficient equality across sub-samples. The principal conclusion then is that policy changes after 1984 were in the main ineffective, failing to reduce labor market rigidities.

Finally, the model was simulated to investigate the degree of inertia and the sources of lags.

---

2/ (...continued)

2/ Fachin (1991) found that an employment equation for Italy over the period 1970-84 exhibited structurally unstable coefficients, while Jaramillo et. al. (1991) found evidence consistent with nonconstant adjustment cost parameters. It should be noted, however, that because of different samples and sample periods these studies are not directly comparable to the results contained here.

1/ The employment equation had an  $F(14,44)=1.79$ ; the wage equation an  $F(11,50)=1.61$ , and the labor-force equation an  $F(16,40)=0.92$ . The 95 percent critical value for the tests was 1.90 or higher.

2/ The sensitivity of employment to output was also allowed to vary.

3/ The t-statistic on the test is 1.74 (without regard to sign).



Parameter Stability, 1977-84 v.s. 1985-94

Dependent variable	$n_t$	$wc_t$	$l_t$
<u>Coefficients</u> (t-statistics without regard to sign)			
Constant	-10.91 (2.7)	-2.17 (2.9)	-1.02 (0.9)
Trend	-0.005 (2.6)	-- (0.4)	-0.0006 (2.3)
2nd quarter dummy variable	0.007 (2.5)	-0.004 (1.7)	-0.004 (1.1)
3rd quarter dummy variable	0.017 (8.0)	-0.001 (0.5)	-0.006 (1.5)
4th quarter dummy variable	0.009 (5.0)	-0.005 (2.3)	-0.003 (1.0)
$n_t$ (1977-84)	...	...	0.913 (7.3)
$n_t$ (1985-94)	...	...	0.730 (6.3)
$n_{t-1}$ (1977-84)	0.534 (4.6)	...	-0.266 (1.3)
$n_{t-1}$ (1985-94)	0.535 (4.6)	...	-0.267 (1.3)
$n_{t-2}$ (1977-84)	...	...	-0.510 (2.4)
$n_{t-2}$ (1985-94)	...	...	-0.510 (2.4)
$n_{t-3}$ (1977-84)	0.116 (1.2)	0.203 (3.0)	0.347 (1.6)
$n_{t-3}$ (1985-94)	0.115 (1.2)	0.202 (3.0)	0.348 (1.6)
$n_{t-4}$ (1977-84)	...	...	-0.210 (1.2)
$n_{t-4}$ (1985-94)	...	...	-0.210 (1.2)
$wc_t$	...	...	0.063 (1.0)
$wc_{t-1}$ (1977-84)	...	0.75 (9.6)	...
$wc_{t-1}$ (1985-94)	...	0.82 (8.5)	...
$l_{t-1}$	...	...	0.562 (3.1)
$l_{t-2}$	...	...	0.210 (1.2)
$l_{t-3}$	...	...	-0.227 (1.4)
$l_{t-4}$	...	...	0.262 (2.0)
$wp_t$ (1977-84)	-0.12 (1.8)	...	...
$wp_t$ (1985-94)	-0.14 (2.9)	...	...
$k_t$	0.86 (2.6)	...	...
$r_t$	-0.08 (3.8)	...	...
$y_t$ (1977-84)	0.148 (3.4)	...	...
$y_t$ (1985-94)	0.139 (2.8)	...	...
$P_t$	...	0.08 (1.3)	...
$WAP_t$	...	...	0.00001 (1.9)
$SSC_t$	-3.93 (4.9)	-4.35 (5.2)	...
$SSC_{t-1}$	3.36 (3.8)	4.33 (4.0)	...
$SSC_{t-3}$	-1.21 (2.1)	-0.18 (0.3)	...

Notes:  $n$  denotes employment,  $wc$  the consumption wage,  $wp$  the product wage,  $l$  the labor force,  $k$  business sector capital stock,  $r$  competitiveness,  $y$  real GDP,  $p$  productivity,  $WAP$  the working age (14-64) population and  $SSC$  the ratio of social security contributions to the wage bill (in index form). All variables, except  $SSC$ , are measured in logarithms. Appendix II provides further details on data sources and definitions.

To conduct the simulations, the three basic labor market equations were augmented by the unemployment and product wage identities, plus an estimated production function to capture the fact that output would be expected to change from the actual path as the simulation resulted in employment paths that differed from actual. <sup>1/</sup> The model was subjected to a 1 percent transitory negative labor demand shock. It was found that the model exhibited persistence in the sense that the path of the variables settled down to equilibrium after a considerable lag (approximately 7-8 years; see

<sup>1/</sup> The production function coefficients were constrained to preserve constant returns to scale.



Charts 8-9). The long-run effect, however, was negligible, as would be expected for a stable system. Equally, when the model was subjected to a 1 percent permanent negative shock, it exhibited imperfect responsiveness in the sense that the endogenous variables reached their new equilibrium level after a considerable lag (also approximately 7-8 years; see Chart 8). The impulse responses of the system are shown in Chart 9. Measures of these effects, and their sources, are contained in the tabulation below.

#### Measures of Persistence and Imperfect Responsiveness

	<u>Persistence</u>	<u>Absolute Persistence</u>	<u>Imperfect Responsiveness</u>
<u>Aggregate</u>	--	<u>1.30</u>	<u>9.94</u>
Employment lags, employment equation	-0.21	-2.38	6.91
Employment lags, wage equation	-2.02	-0.90	37.56
Wage lags, wage equation	0.07	0.31	43.96
Labor supply lags plus interaction effects	2.16	4.27	-78.49

Note: Persistence is defined as the sum of deviations from the base path when unemployment is subjected to a temporary shock. Absolute persistence sums absolute deviations. Imperfect responsiveness sums deviations from the base path after subtracting the change in the long-run equilibrium resulting from subjecting unemployment to a permanent shock. Both measures are standardized by the size of the shock, which is a 1 percent reduction in labor demand. The sources of persistence and imperfect responsiveness are calculated by leading all lagged terms (setting  $L^{-k}x_{t-k}$ ) of the source variable while leaving all other lags intact.

The model exhibits positive persistence, as unemployment is driven up for up to two years following a temporary shock. However, the discouraged worker effect eventually drives so many workers out of the labor force that measured unemployment undershoots its long-run path (Chart 9a). <sup>1/</sup> In fact, the sum of deviations is approximately zero, as is shown by the aggregate persistence measure. The absolute persistence measure is strictly positive, reflecting the undershooting. Employment also exhibits overshooting, although the effect of a temporary shock is longer lasting. Some overshooting occurs because of output effects. The inclusion of a production function magnifies swings in employment, because as employment comes down, output is also reduced, which further reduces employment; the opposite occurs as employment increases. In terms of both persistence measures, employment lags in the employment equation contribute negatively.

<sup>1/</sup> Of course, to the extent that measured unemployment is reduced by the discouraged worker effect, the social welfare effects may be worse than they appear.



Chart No.8  
ITALY  
Persistence vs. Imperfect Responsiveness

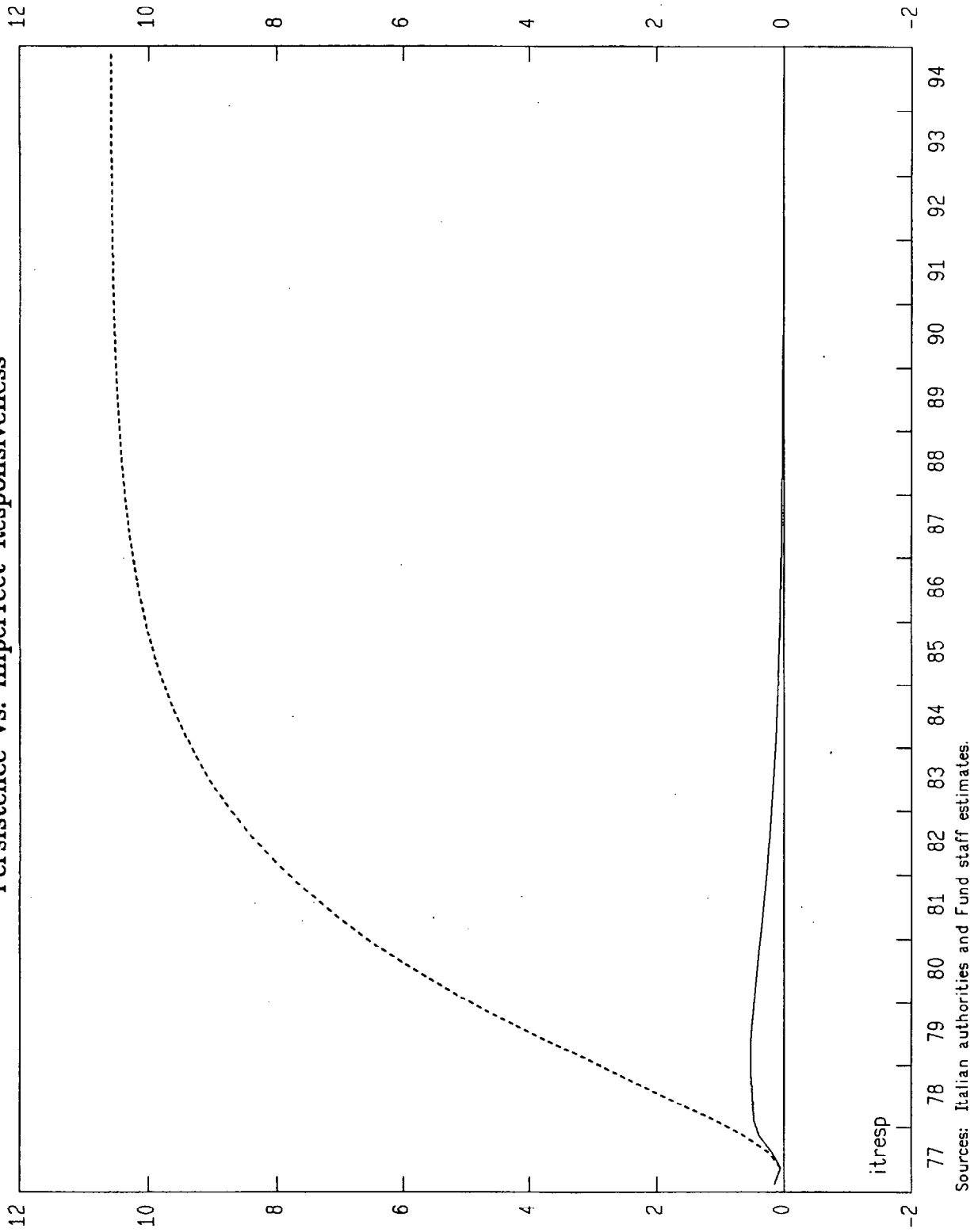
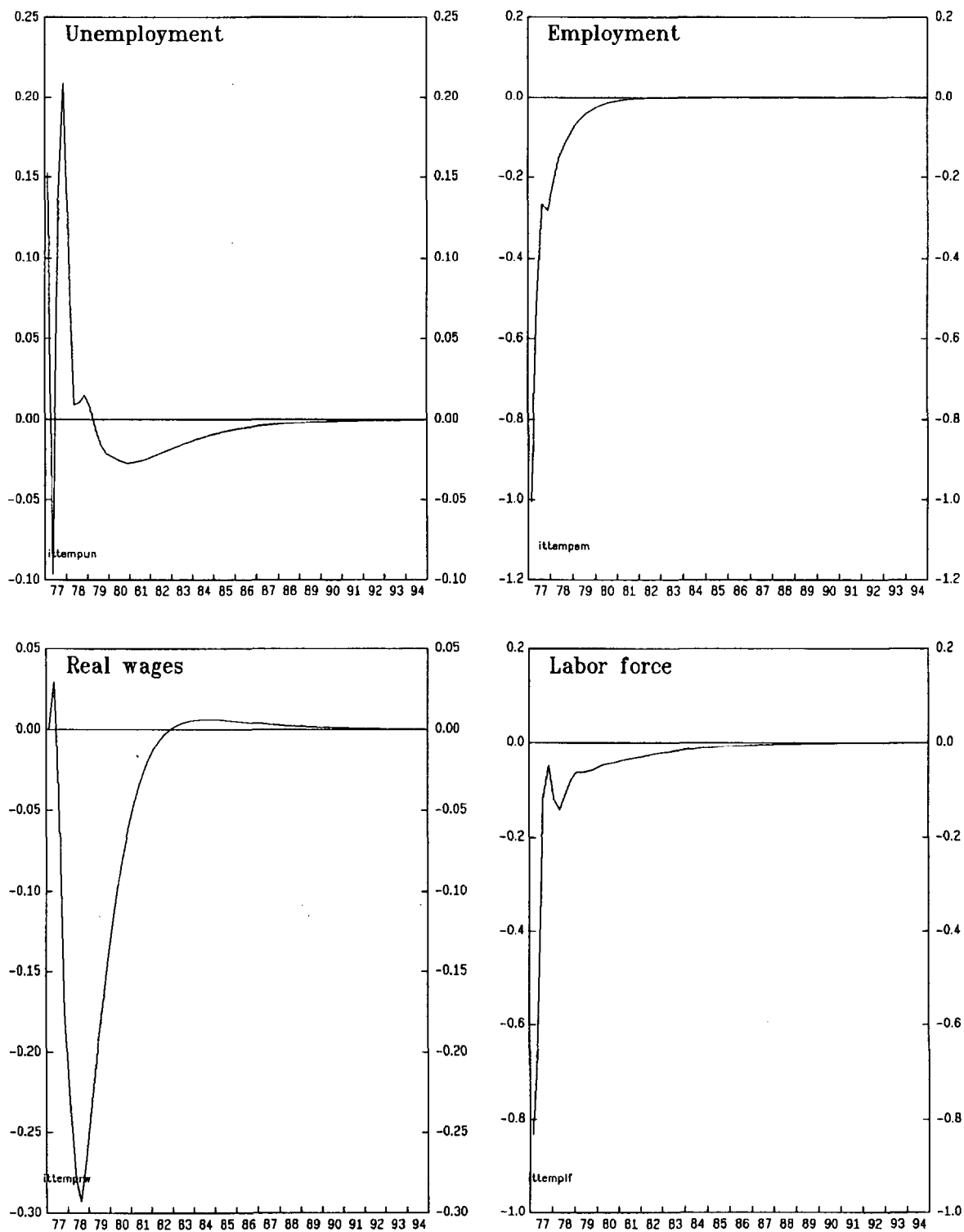




CHART No 9a

ITALY

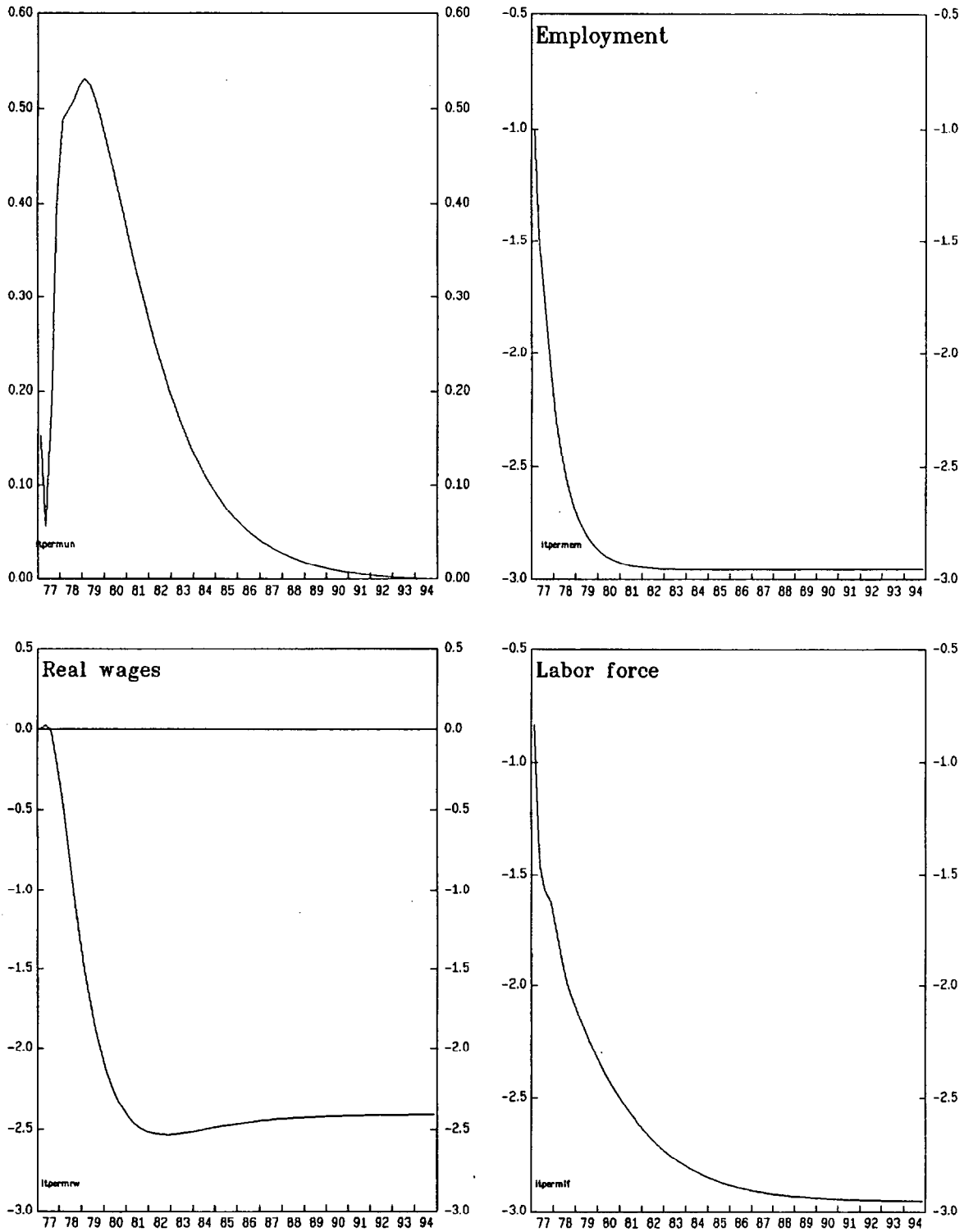
# Impulse Responses, Labor Demand (Temporary shock)



Sources: Italian authorities and Fund staff estimates.



ITALY  
Impulse Responses, Labor Demand  
(Permanent shock)



Sources: Italian authorities and Fund staff estimates.







This can be explained by the fact that lags in the employment equation delay the initial fall in employment, making the reversal of employment to its eventual equilibrium level faster. The wage staggering effect contributes similarly to persistence positively, however, by extending the time period over which wages adjust; in addition, wages also slightly overshoot, and the absolute persistence measure is higher.

By contrast, the insider employment effect tends to moderate persistence. An intuitive explanation is that wages fall as the stock of insider employees is reduced, which tends to moderate the fall in employment, which therefore adjusts faster back to its initial equilibrium level. The lag effects stemming from the labor supply equation are more complicated to understand and turn out to be very difficult to separate into their constituent parts, because they tend to interact intimately with lag effects from the employment equation. More intuitive results are obtained by considering these effects together. Clearly, although labor force adjusts temporarily downwards as does employment, the net effect on unemployment remains positive. Hence, the net effect of the lagged terms plus their interaction is to contribute significantly to both persistence and absolute persistence.

The model also exhibits positive imperfect responsiveness, to which all but one term contribute. Clearly, employment lags cause employment to fall to its new equilibrium level sluggishly, contributing to imperfect responsiveness. The wage lags also cause wages to adjust downward toward their new equilibrium level with a lag. The two most interesting reactions to permanent shocks come from the insider employment and labor supply effects. The employment lags in the wage equation contribute positively to imperfect responsiveness, because by reducing wages they tend to increase employment and hence delay its reduction to the new, lower equilibrium level. The discouraged worker effect together with employment interactions tends by contrast to strongly speed adjustment, because in Italy labor force participation effects are especially strong. <sup>1/</sup> Some workers are so discouraged as to leave the labor supply permanently: this causes equilibrium unemployment to shrink, which makes the transition to the new equilibrium level occur faster.

##### 5. The recent recession and increased labor market flexibility

Whereas the labor market policies of the mid-1980s failed to have much of an impact, the same cannot be said for the reforms after 1991. Employment appeared much more flexible, although we have evidence for this only for the downward direction. This section will attempt to provide an interpretation of events, although the short sample and some data uncertainties mean that the conclusions reached here should be treated with caution.

---

<sup>1/</sup> In the early part of the twentieth century, it will be recalled that the discouraged worker effect was also very strong, resulting in very significant outward migration flows.



To gain an understanding of changes in labor market behavior after 1991, the model was estimated only up to 1991, and used to produce forecasts up to 1994: Chart 10 contains the results. Clearly, employment fell much more than would be expected based on the historical relationship between output and employment during a recession (see also Charts 11-13). A formal statistical test of parameter change along the lines pursued earlier is not possible, because there are not enough degrees of freedom. However, it is possible to perform Chow's predictive test, which compares the forecasting performance of the model with actual developments. When this test was performed, it was found that the hypothesis of parameter constancy in the employment and labor-force participation coefficients was decisively rejected, whereas for the wage-setting equation it was accepted. 1/ The results for the wage-setting equation are somewhat surprising, because it is generally thought that wage behavior changed markedly after the recent reforms. The results suggest that wage-setting behavior has not changed very much, although it is quite possible that labor demand could have become much more sensitive to wage variation. It should also be kept in mind that the model is couched in terms of real wages, and that there could well have been a substantial improvement in terms of nominal wages.

Although we do not have sufficient degrees of freedom to test for parameter inconstancy in general, it is possible to get some feel for the sources of the changes by imposing some priors. This is accomplished by re-estimating the equations for two sub-samples, 1977-91 and 1992-94 but allowing only a small number of the most policy-relevant coefficients to change. The employment equation had difficulty distinguishing between changes in the relationship between employment and output, in the effect of wages on employment and a level shift, which is not surprising given the shortness of the sample. When all three were allowed to change, the effect of wages on employment increased very substantially, from -0.11 to -0.87. The change was not statistically significant at conventional levels of confidence (the t-statistic was 1.3), but if this result held over a longer period it would be a very important development. The employment adjustment effect was lower than it was when the equation was estimated over the full sample, with lagged employment coefficients at 0.41 and 0.08, respectively. Moreover, a statistically significant reduction in the third lag was observed after the reforms. In addition, a statistically significant upward level shift seemed to take place, while the sensitivity of employment to output appeared to have weakened. 2/ The wage setting equation showed a decline in the wage-staggering effect: the coefficient on lagged wages fell

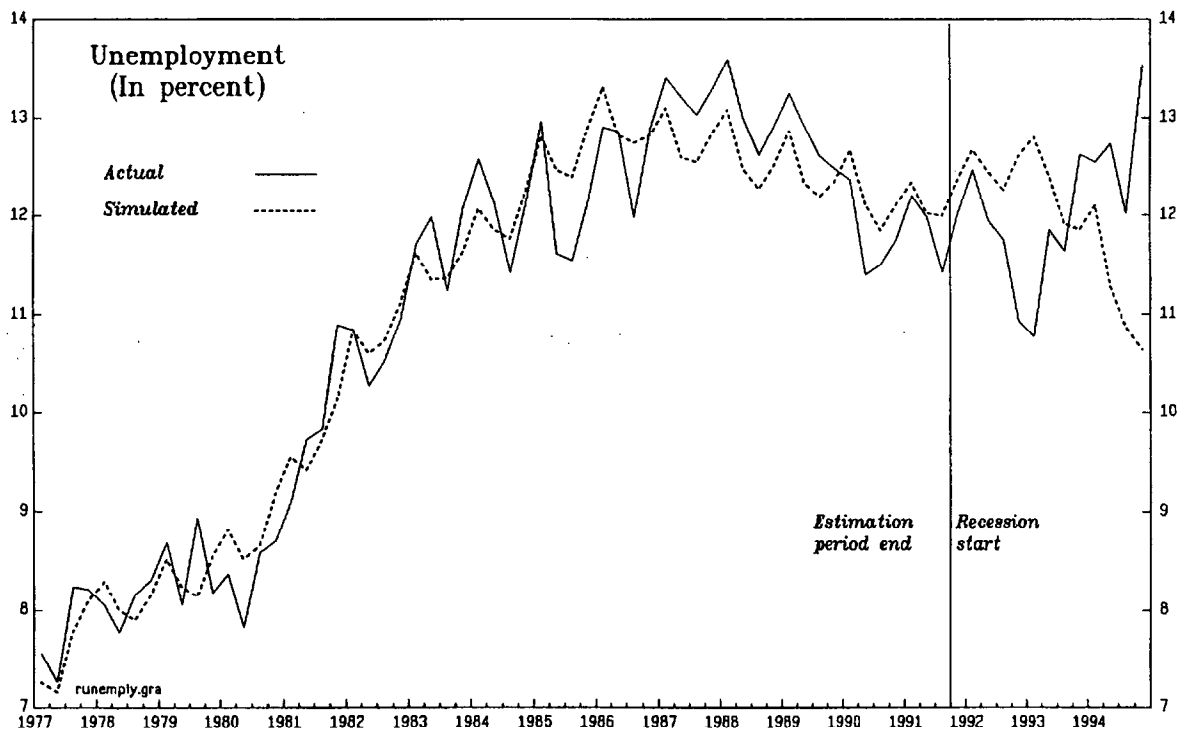
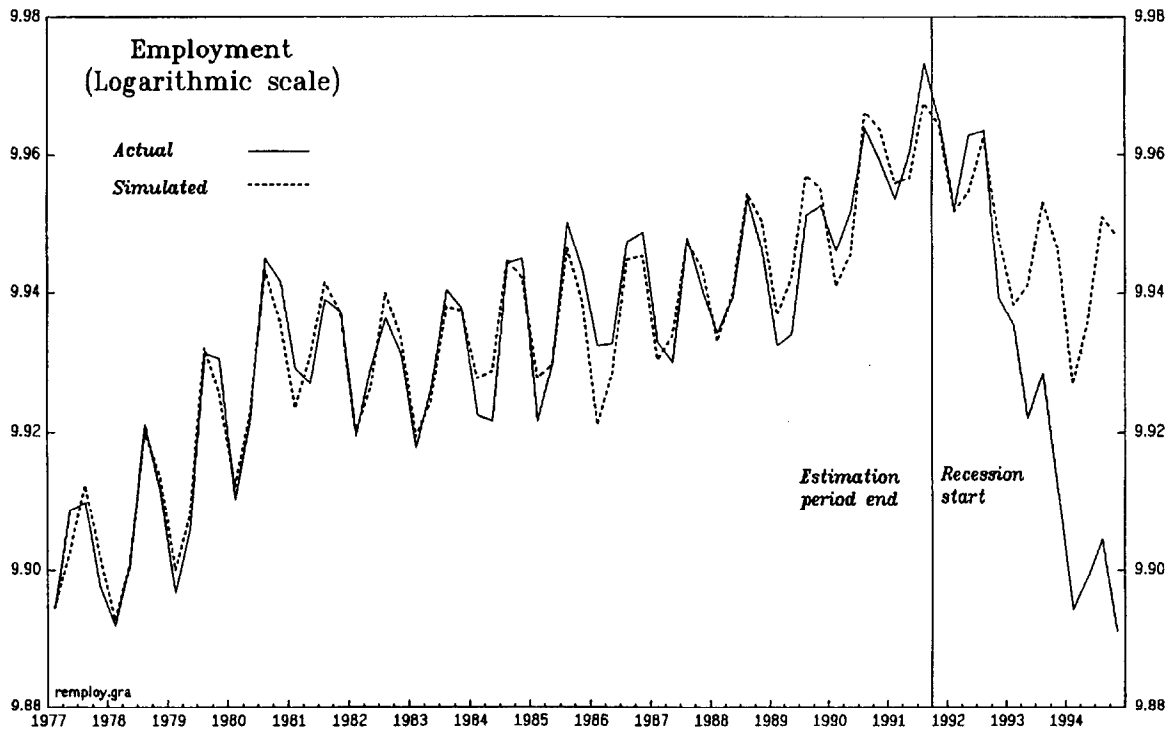
---

1/ Chow's predictive test is an F-test: for the employment equation,  $F(12,58)=3.12$  and for the labor-force equation, it is  $F(12,56)=4.11$ , compared with a critical value of around 1.9. For the wage equation, however, it is  $F(12,61)=1.47$ .

2/ This last result is surprising, because a number of observers interpreted developments during the last recession as implying an increase in the sensitivity of output to employment. The regressions seem to indicate instead that firms continued to shed labor even as output rebounded.



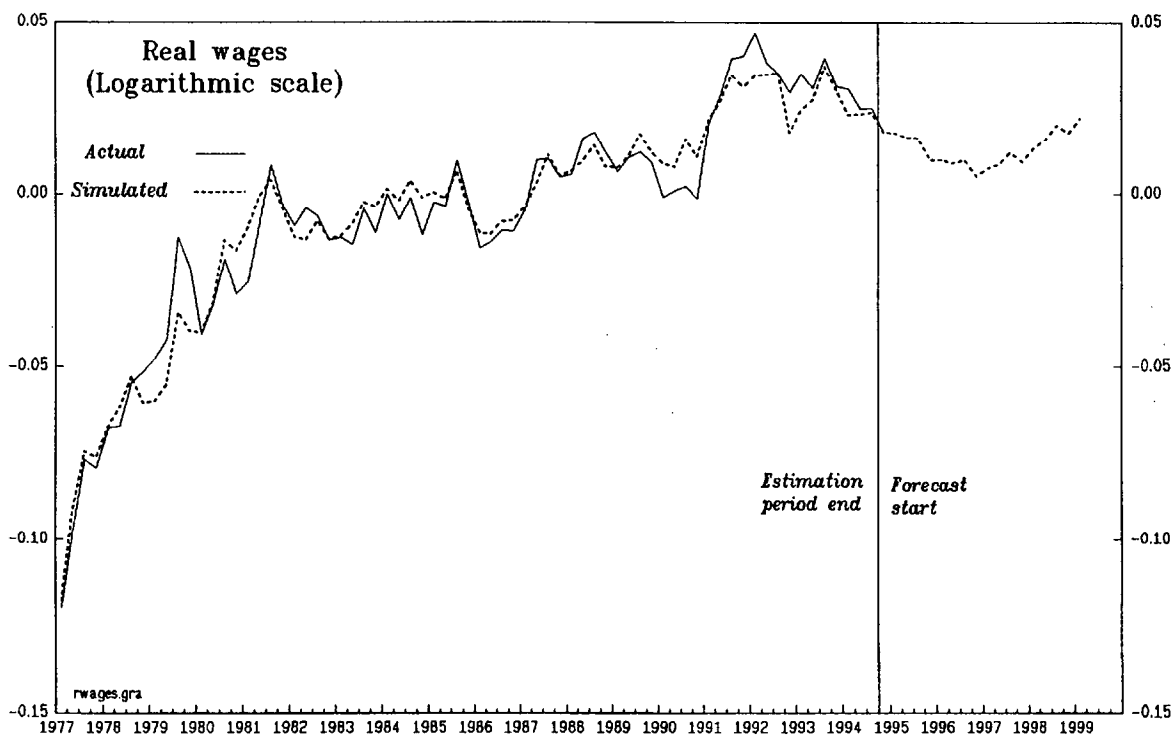
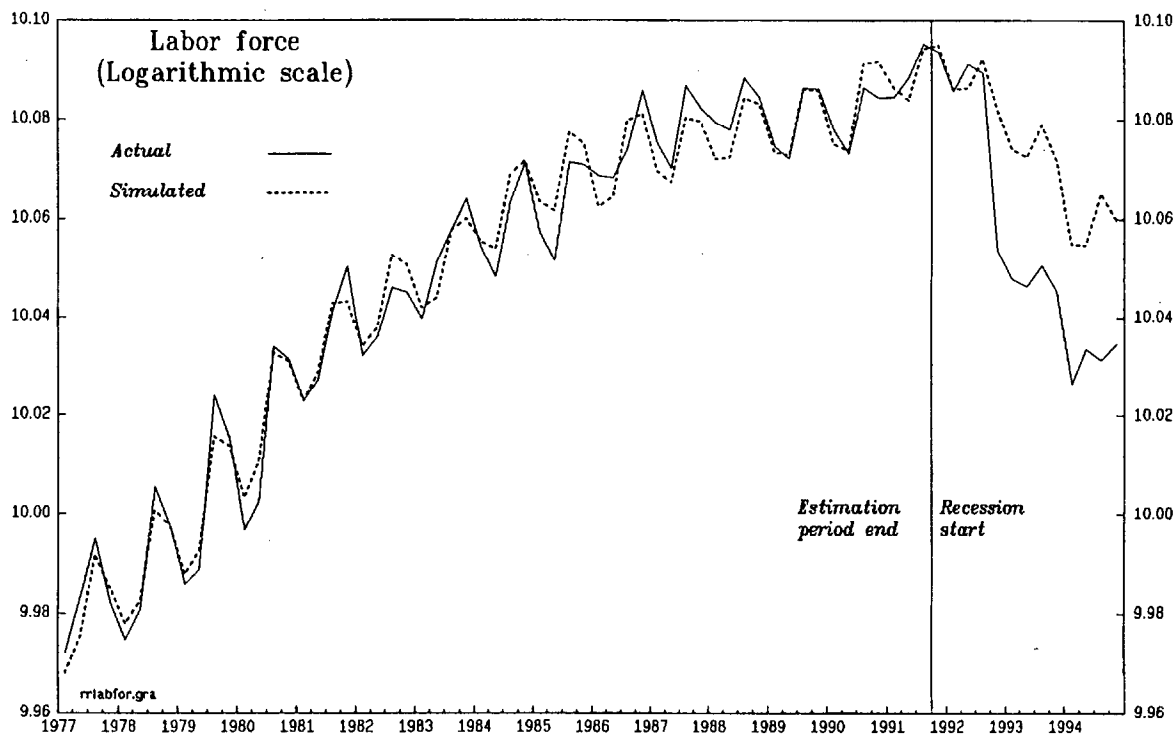
ITALY  
Employment and Unemployment



Source: Italian authorities and Fund staff estimates.



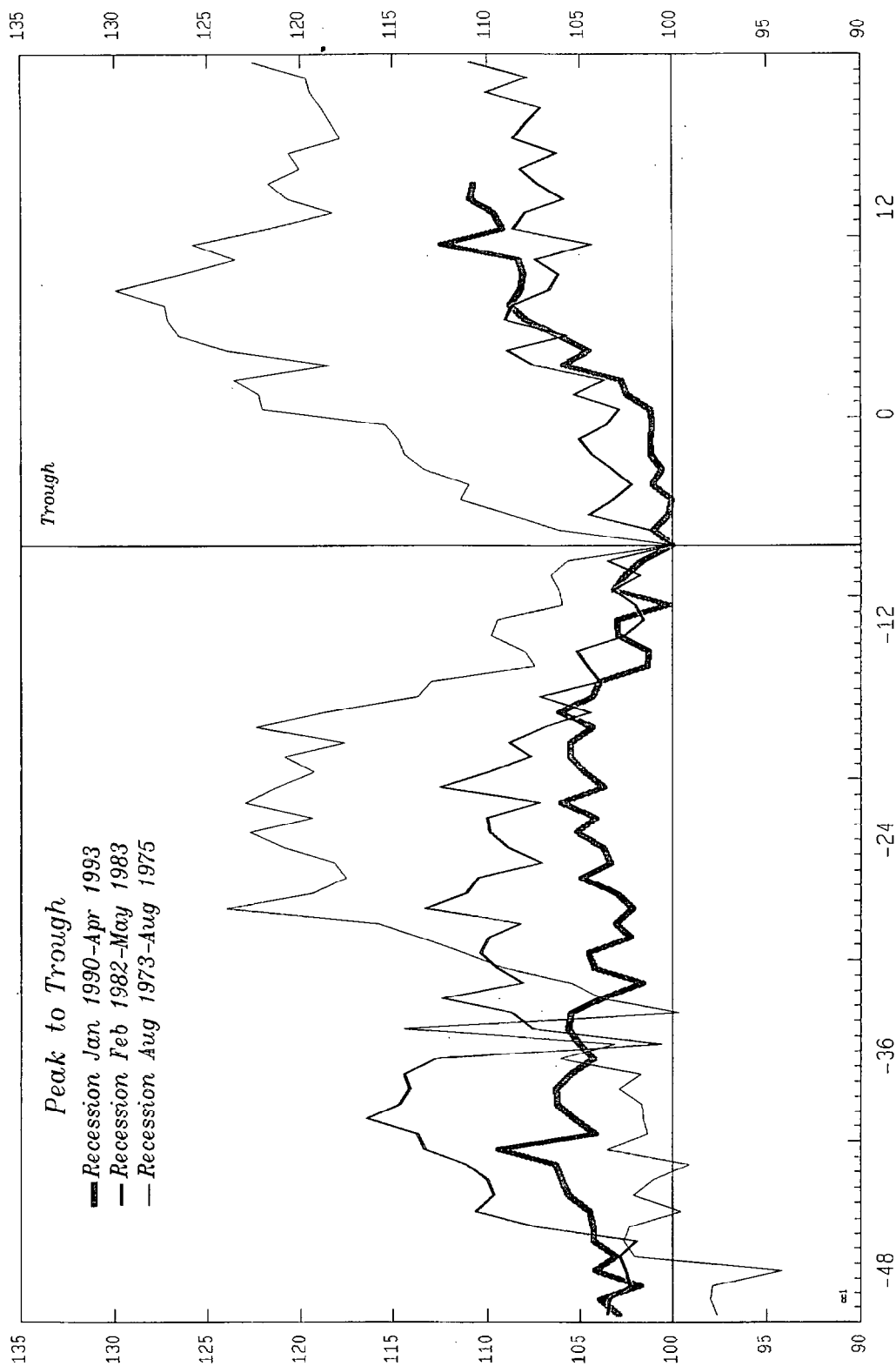
# ITALY Labor Force and Real Wages



Source: Italian authorities and Fund staff estimates



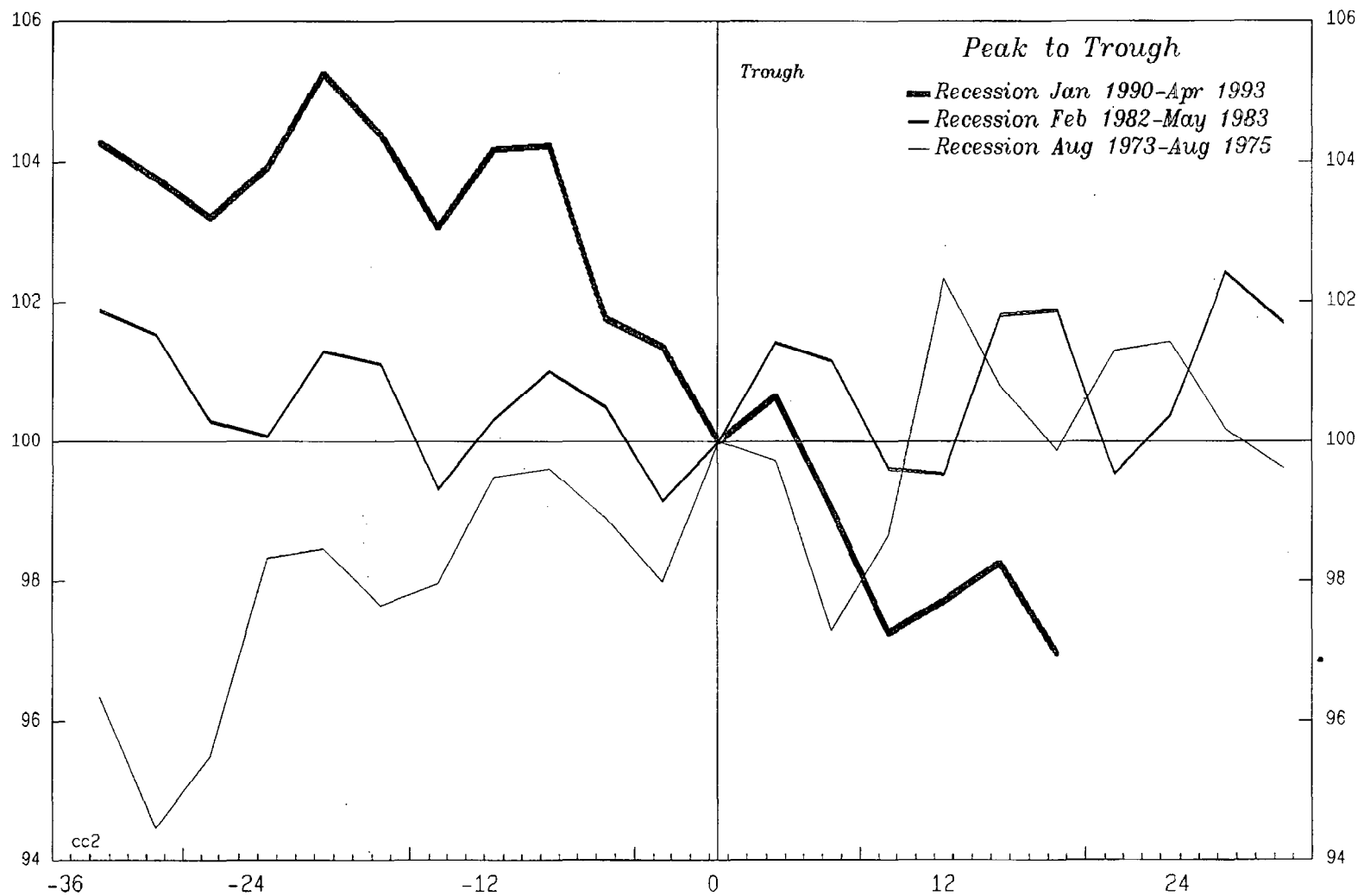
CHART 11  
ITALY  
Behavior of the Business Cycle, 1973 - 1994  
Industrial Production



Source: Bank of Italy; and staff estimates.



CHART 12  
ITALY  
Behavior of the Business Cycle, 1973 - 1994  
Employment

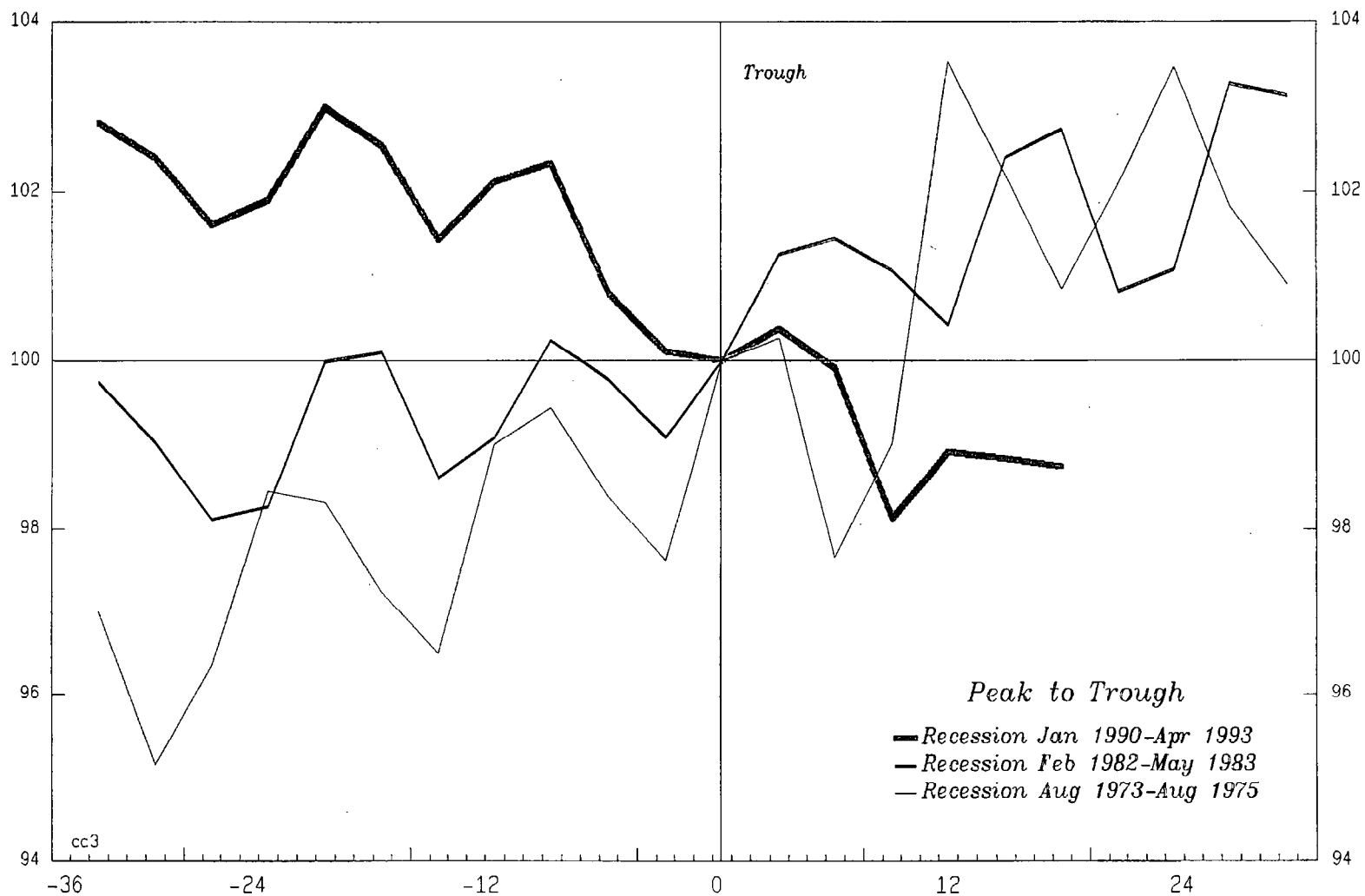


Source: Bank of Italy; and staff estimates.

1/ Employment series reconstructed prior to 1992 and spliced prior 1981.



CHART 13  
ITALY  
Behavior of the Business Cycle, 1973 - 1994  
Labor Force



Source: Bank of Italy; and staff estimates.

1/ Labor force series reconstructed prior to 1992 and spliced prior 1981.







from 0.75 to 0.52. Again, the change was not statistically significant at conventional levels of confidence, but, with a t-statistic of 1.5, could prove more significant in the future. Finally, the labor-force equation showed both economically and statistically significant reductions in the discouraged worker effect, with lower coefficients on lagged employment.

To summarize, preliminary results tend to suggest that labor market behavior changed markedly after the reforms. Employment was much more flexible, with a weaker employment adjustment effect and a weaker discouraged worker effect. Firms became much more sensitive to wages and the wage-staggering effect became less pronounced. It was not possible to detect statistically significant changes in real wage-setting behavior, but this could change as more data become available (reforms on wage bargaining have only been in place since 1994). These results accord well with the nature of the reforms, which concentrated on removing impediments to hiring and firing and eliminated the *scala mobile*.

#### 6. The future

To investigate further the possible future effects of a more flexible labor market, the model (estimated on the basis of the full sample) was simulated to produce forecasts for employment, wages, labor force and unemployment. These are presented in Chart 14. The underlying assumptions, including output and capital formation projections, were consistent with the assumptions contained in the most recent version of the World Economic Outlook. 1/ The simulation shows that although employment is projected to increase substantially, and real wages are projected to decrease somewhat before they rebound, unemployment falls by less than 1 percent over the forecast period. This result is consistent with the average behavior of unemployment over the whole sample, but does not take into account the possibility of continuing shedding of employment by firms. Of course, the previous section provided evidence which suggests that there has been a regime shift as a result of the labor market reforms. Future developments will therefore hinge on which of these two forces predominates and on whether the labor market reforms are maintained or, better yet, strengthened.

An important question is to attempt to investigate the potential positive impact of making the labor market more flexible and reducing the various adjustment lags. This will provide some indication of the "upside" potential of labor market reforms. To investigate this, an additional simulation was performed which assumed that labor shedding did not continue. 2/ The equations were simulated with lagged coefficients on

---

1/ The forecasts reported here utilize information available as of April 1995.

2/ Clearly, it is not yet possible to judge whether productivity gains have run their course. One can conceive of a realistic scenario whereby firms continued to shed labor, which would have the effect of weakening output growth through the production function.



employment and wages consistent with the reductions suggested by the preliminary estimates reported in the earlier section. The lagged employment terms in the employment equation were reduced by 0.20, the wage elasticity of employment increased by -0.76, the lagged wage coefficient in the wage equation was reduced by 0.25 and the lagged employment terms in the labor force equation were reduced by 0.02. <sup>1/</sup> The results can be seen in Chart 15. With the earlier mentioned caveats in mind, they indicate that impressive gains in employment, wages and labor force are possible and that unemployment could fall to less than 10 percent--translating the results of the WSF-adjusted unemployment figures to the national definition--by the year 1999.

## 7. Conclusion

The structural VAR model that was estimated in this paper appears to capture well a number of important dynamic and structural relationships in the Italian labor market. The VAR was utilized to investigate Italian unemployment from different points of view. Over the long-run, it was found that increasing Italian unemployment resulted from the interaction between two factors, adverse macroeconomic shocks and an inflexible wage-setting mechanism. Over the short- to medium-run, substantial lags were found to exist which were linked to a number of policies, and which interacted in significant ways. When subject to a temporary shock, unemployment tended to settle down to equilibrium after a considerable lag (7-8 years). Employment adjustment costs and the wage staggering effect tended to increase unemployment persistence, while the insider employment effect tended to reduce it. Unemployment also responded sluggishly to permanent shocks, due to lags from all effects except the discouraged worker effect.

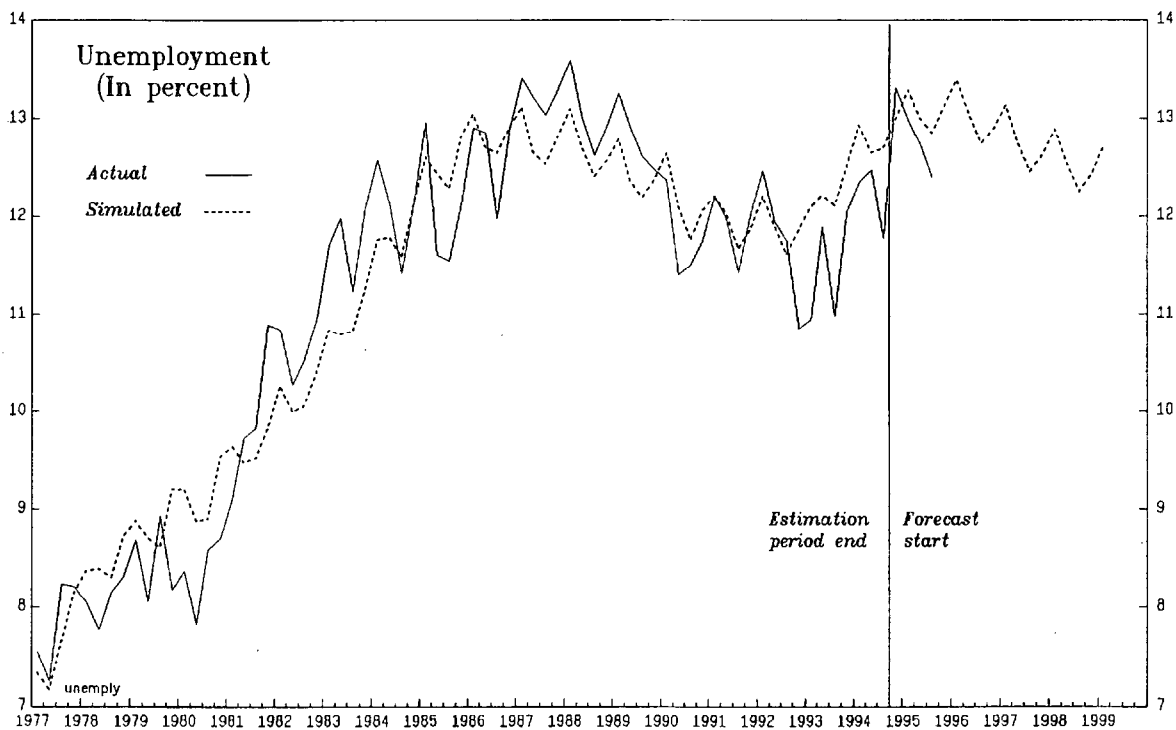
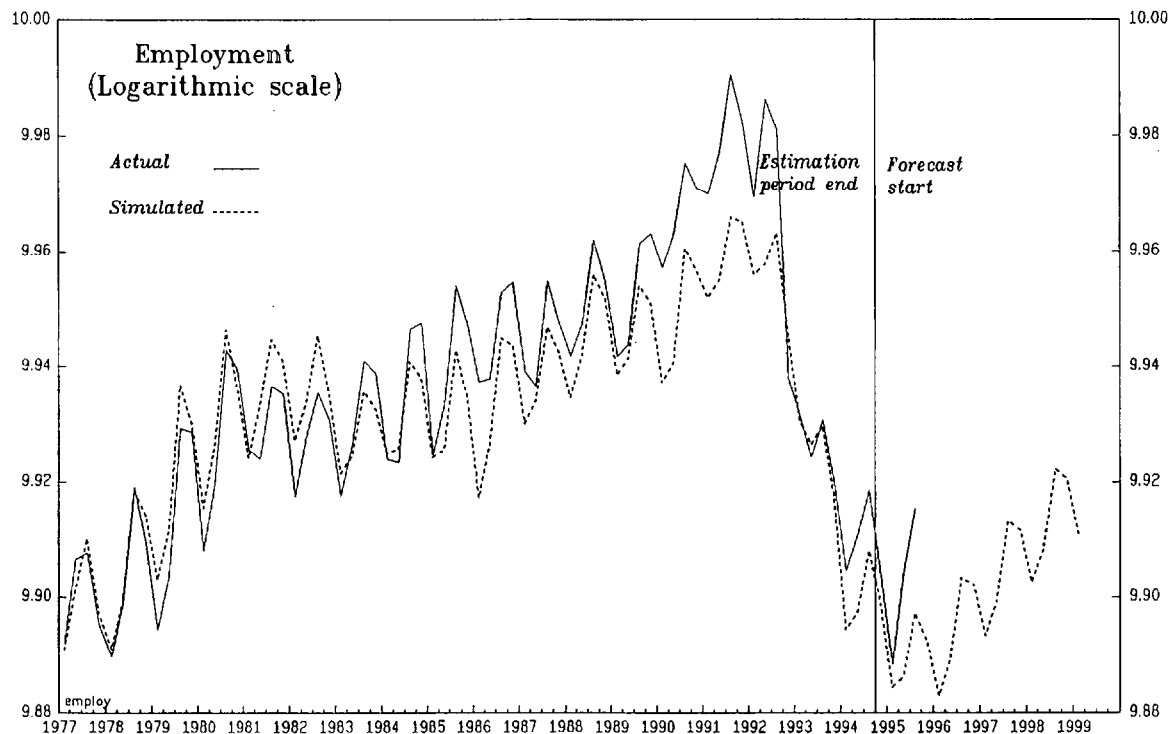
The labor market reforms that were introduced after 1984 were found as a result of statistical tests to have been mainly ineffective in reducing labor market rigidities. However, the reforms after 1991 appear to have resulted in a labor market that exhibits substantially more flexibility on the employment and labor-supply sides, although wage-setting remains a question mark. There is, however, some evidence of a reduction in wage-staggering, which is the expected result of the abolition of the *scala mobile*. Provided that the labor shedding witnessed since the last recession is discontinued and that the labor market flexibility that seems to have increased after 1991 persists or is strengthened, significant gains against unemployment could well take place.

---

<sup>1/</sup> Of course, tinkering with a dynamic model by changing only a few parameters will in general result in outcomes that do not make economic sense. The simulation reported here also required level shifts in the employment and labor force equations which were, however, much smaller than the estimated changes.



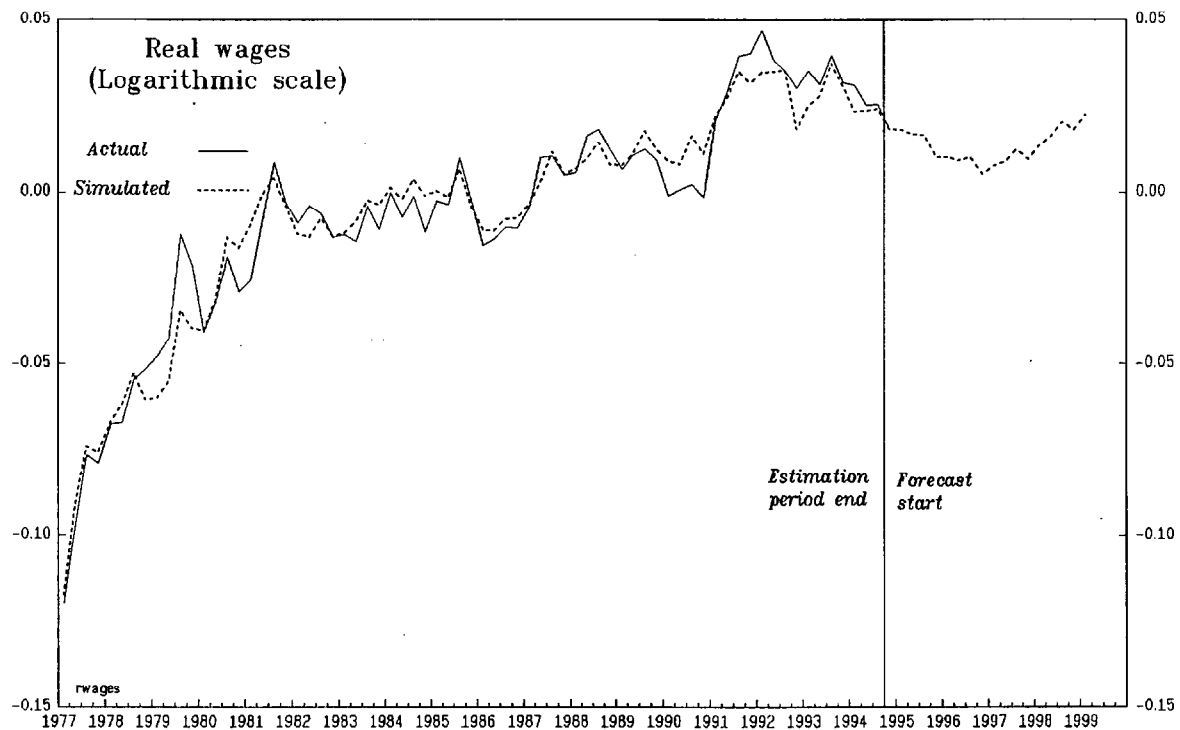
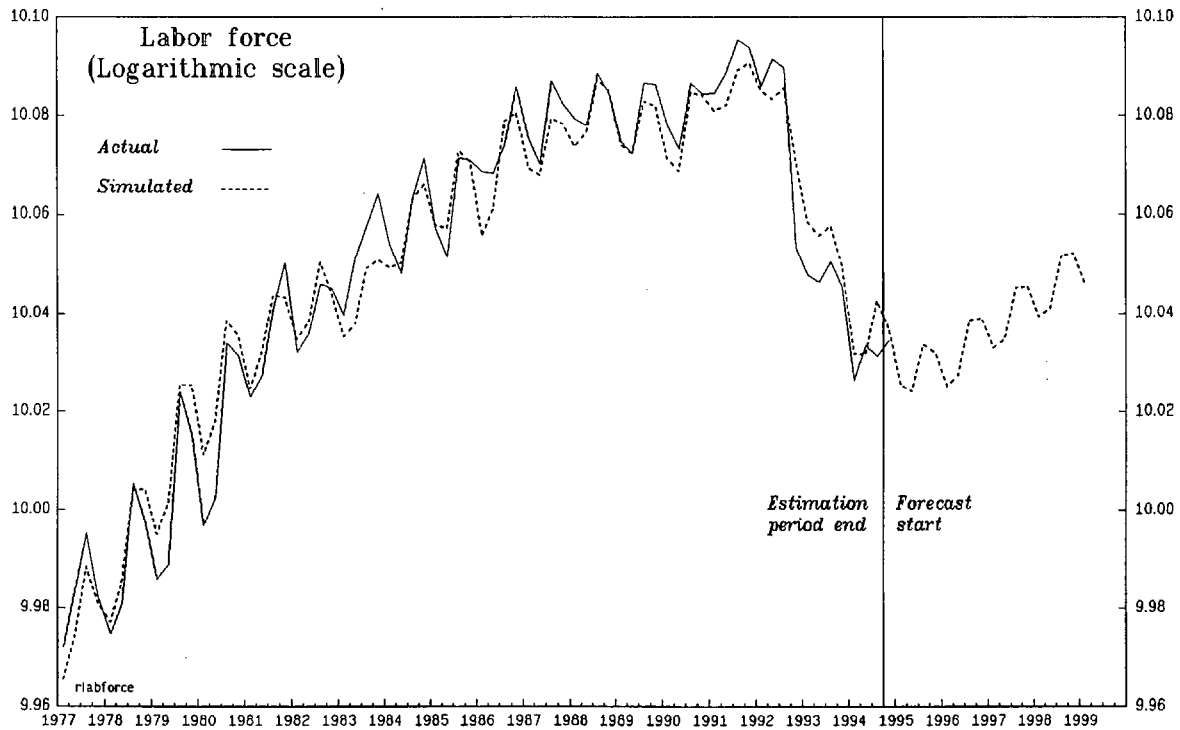
ITALY  
Employment and Unemployment



Source: Italian authorities and Fund staff estimates.



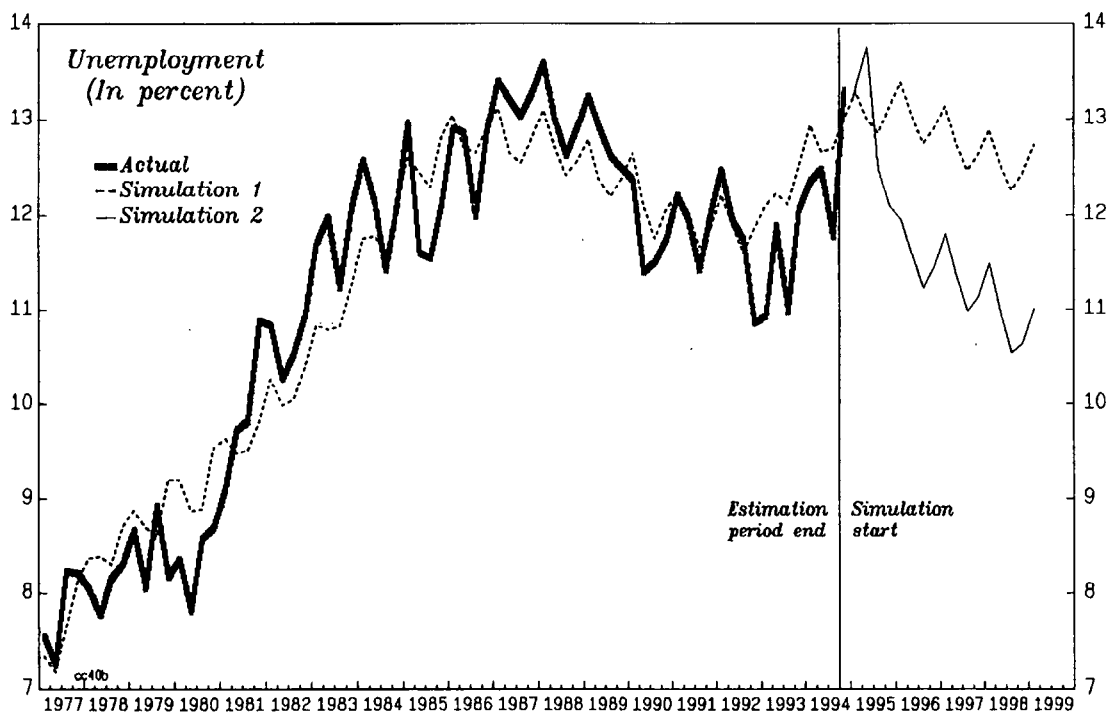
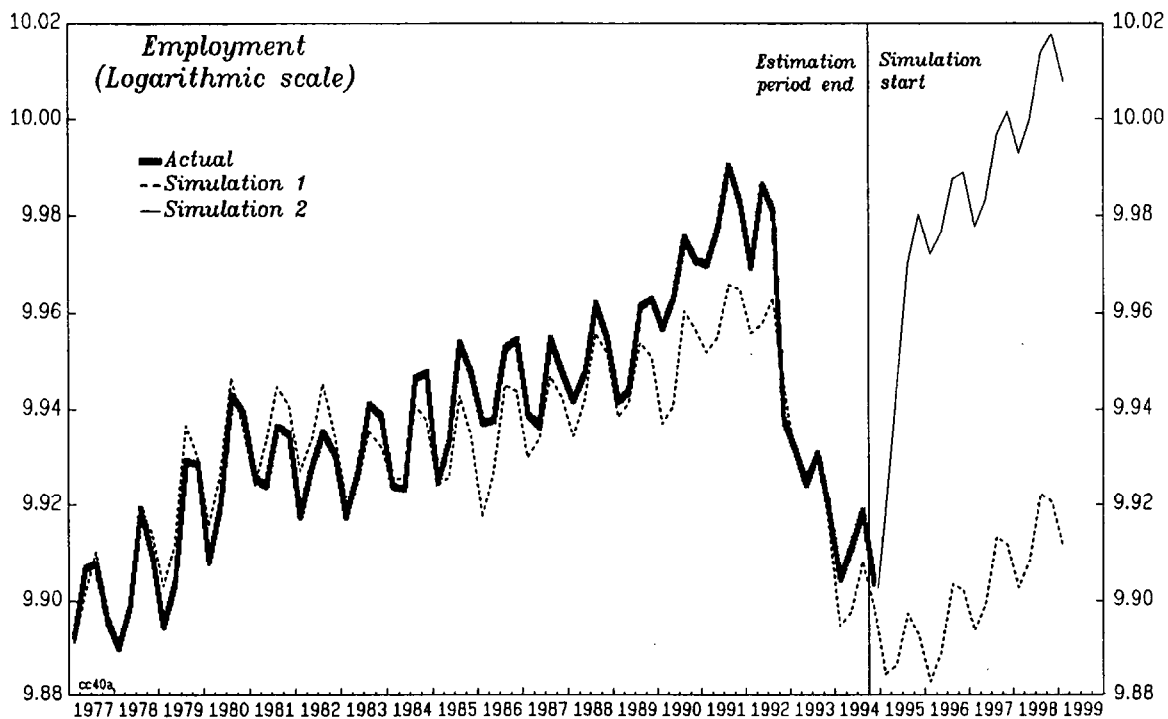
ITALY  
Labor Force and Real Wages



Source: Italian authorities and Fund staff estimates.



CHART 15a  
ITALY  
Employment and Unemployment  
(Post 1994 scenarios)

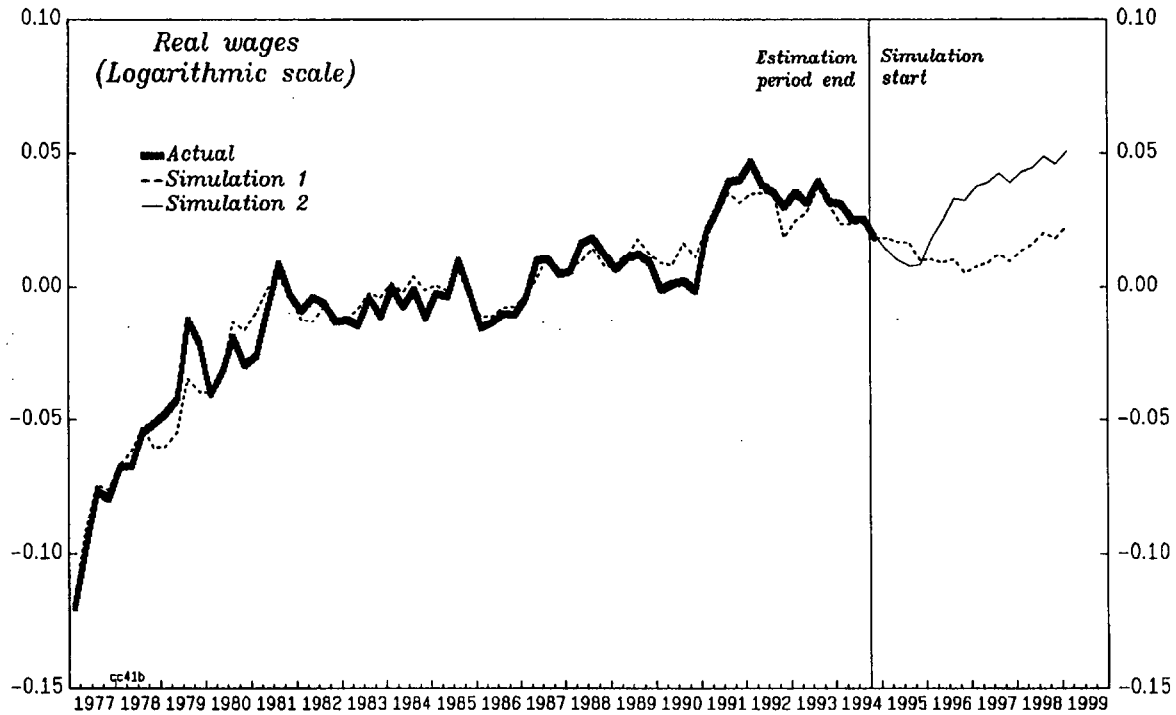
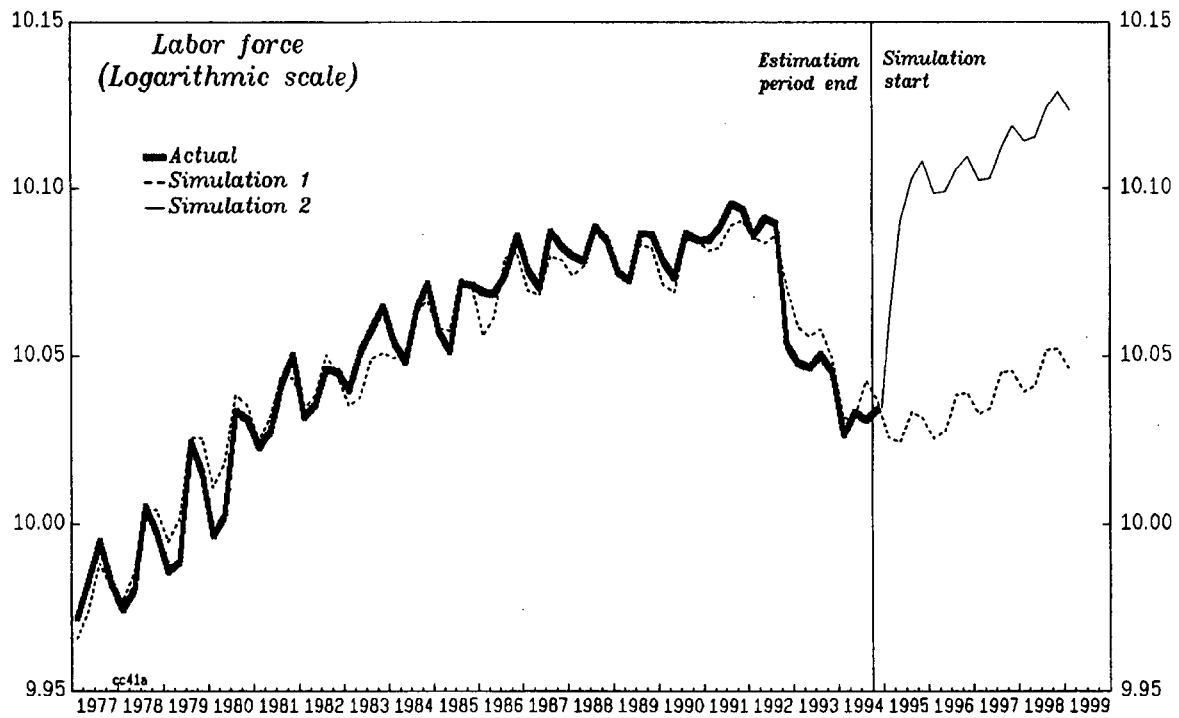


Sources: Italian authorities and Fund staff estimates.



CHART 15b  
ITALY

Labor Force and Real Wages  
(Post 1994 scenarios)



Sources: Italian authorities and Fund staff estimates.



# **ITALY** **Labor Market Institutional/Policy Events**

Date	Event	Main Affected Areas	Source
84	"Solidarity contracts" introduced, whereby firms with more than 1,000 employees could allow workers to share the work. Were not much used, however.	Hire/Fire	WP/94/30
85	3-yr wage agreement FAILED to be concluded.	WB	SM/86/135
86 JAN	SM reformed: from quarterly to semi-annual adjustments (MAY/NOV). Coverage reduced, with 100% coverage only applying up to monthly wages of L580,000 and 25% thereafter. the L580,000 threshold was indexed to the "indice sindacale". Bonuses and overtime pay were not indexed. End of flat adjustment-based system, move to proportional system.	SM	SM/86/135+ SM/92/6+ OECD/86-87
87 JAN	3-yr wage agreement finally concluded. Most contracts had expired in '85, and wage growth during '86 was moderate despite the absence of contracts.	WB	SM/88/34+ OECD/86-87
88	Employers required to contribute 4.5% of the WSF benefits accruing to workers as a Social Security contribution. Until now, the WSF was free to employers.	WSF	WP/94/30
89 SEP	Employee guarantees in cases of dismissal on disciplinary grounds extended to firms with less than 16 employees.	Hire/Fire	OECD/89-90
90	3-yr wage agreements concluded for public sector and most of private sector. Some agreements contained forward-looking provisions based on targetted inflation for the first time (given that actual-targetted inflation was less than 0.75%). Certain contracts froze the wage drift component.	WB	SM/91/12
91	"Mobility list" created which grants special benefits to redundant workers arising from collective redundancies. Workers get 80% percent of last wage up to a maximum of L1.2m/month, for a maximum of 12 months. It is renewable once for workers over 40 yrs old and twice for workers over 50 (but at 20% less benefits).	UnB	WP/94/30
91	Hiring system regulating the rank order of hires finally ABOLISHED. Some rules remained, mandating a 15% quota for the disabled for firms with more than 35 employees and a 12% quota for the "disadvantaged" (long-term unemployed) workers on the "mobility list" for firms with more than 10 employees. The 12% can be increased to 20% by regional employment agencies, provided the MoL concurs.	Hire/Fire	WP/94/30
91 JUL	WSF reformed: "ordinary" wage supplementation (WS) extended to cover white collar workers, who will also become subject to wage withholding. WS limited to industrial firms with at least 15 dependent employees and extended to trade sector enterprises with at least 200 dependent employees. Maximum length for "extraordinary" intervention set at 36 months in 5 yrs (st exeptions). Same benefits as WSF now apply to workers on "mobility list".	WSF	SM/92/6
91 DEC	Accord suspended wage indexation.	SM	OECD/94
92 MAY	SM indexation adjustment SUSPENDED (did not take place).	SM	SM/92/6
92 JUL	Accord formally ENDED SM system of wage indexation. Stipulated suspension of all bargaining rounds at the plant level during '92/'93. Instead, employees would get 13 monthly payments of L20,000 during '93, partly compensating for likely indexation-related wage increases in that period.	SM/WB	SM/92/232
93 JAN	Labor force survey definitions made more internationally comparable, but a brake in the relevant time series was introduced.	Data	SM/93/39
93 JUL	Wage-bargaining system reformed: SM definitively abolished; 2 levels of wage-bargaining defined (national/sectoral and regional/firm based); timetable and procedures set for wage bargaining and conflict resolution; benchmarks set to be taken into account during negotiations (notably targetted inflation at the national level). 4-yr national labor contracts while nominal wages to be renegotiated at 2-yr intervals.	WB	SM/93/39

**NOTES:** SM = "Scala Mobile" (Sliding Scale).  
WB=Wage Bargaining  
WSF=Wage Supplementation Fund ("Cassa Integrazione Guadagni").  
UnB=Unemployment Benefits; WSF is a form of UnB.



**ITALY**  
**Labor Market Institutional/Policy Events**

Date	Event	Main Affected Areas	Source
Post WWII	SM introduced; allowed for region-specific adjustments based on regional RPIs.	SM	SM/92/6
52	SM evolved to national scheme of uniform adjustments based on a specially calculated index ("indice sindacale") which put more weight on consumables such as food but excluded petrol while putting less weight on other energy products.	SM	SM/92/6
57	SM adjustments done on a quarterly basis.	SM	SM/92/6
??	Initial system on hiring rules emerged. Nonagricultural companies required to hire employees from a PUBLIC LIST in the order in which they appeared. The state took into account factors such as status of employment, duration of unemployment (if unemployed), and social factors, such as the number of dependents in determining rank order. Private employment agencies were banned.	Hire/Fire	WP/94/30
69 FALL	"Hot autumn" of worker unrest that led to the Charter of Worker's Rights (Statuto dei Lavoratori) that provided the basis for restrictive employment regulations.	Hire/Fire	WP/94/30
70	Law 300/1970 gave special privileges (rights to hold meetings at the place of work; work-time could be used by union officials for union business) to the three largest national unions.	WB	WP/94/30
70	3-yr wage agreement concluded. Granted "huge" increases.	WB	SM/81/131
73	3-yr wage agreement concluded. Granted "huge" increases.	WB	SM/81/131
75	SM agreement between the social partners established modern system (put into effect fully in '77).	SM	OECD/83-84
76	3-yr wage agreement concluded. Granted "lower" increases.	WB	SM/81/131
77	Severance pay system reformed. Wage withholdings put in a special severance fund but SM component excluded from wage basis ('73-'76 system included). Amount awarded proportional to avg. monthly wage (100% for salaried, less for workers) and adjusted to reflect level of last wage payment.	Hire/Fire	SM/82/178
77 END	75 reforms of SM put into effect. Now, SM standardized and extended from industrial sector to all the work force. Employees accorded compensation of a set amount, L2,389 per percent increase per month in the "indice sindacale".	SM	SM/81/131
79 SUMMER	3-yr wage agreement concluded; Granted "lower" increases; equal increases granted to all workers except in industry; agreed that next round would allow more differentiation.	WB	SM/81/131
79 END	Public sector workers (2.3m) agreed to put the SM on a quarterly rather than a semi-annual basis.	SM	SM/81/131
80	Monthly maximum paid from WSF raised from L200,000 to L600,000 for salaried employees; it remained at L200,000 for workers although they received partial adjustment for inflation (average coverage fell from 80% to 76%).	WSF	SM/82/178
82 JUN 1	Severance pay system reformed. Constant of proportionality reduced from 100%, but SM component included in basis. Also, adjustment to enterprise contributions was raised. Indexation of private sector severance payments partially restored.	Hire/Fire	SM/84/10+ OECD/82-83
82 JUN 2	3-yr wage agreements FAILED to be concluded (except for public transport and bank employees). Discussions about reforming the SM coincided with wage negotiations, resulting in stalemate. "Confindustria" led the way; 83h2 others followed.	WB	SM/84/10
83 JAN 22	SM revised: sliding scale index rebased from AUG-OCT 74 to AUG-OCT 82. Monthly value of each point raised from L2,389 to L6,800. Degree of indexation fell 15%, because a 1% increase under the new index corresponded to a 3.35% increase under the old index.	SM	SM/84/10+ OECD/83-84
83 JAN 22	Wage negotiations' stalemate broken. Overall wage growth of 13% in '83 and 10% in '84 agreed to. Contractual changes in wages to be limited to L25,000 ('83), L35,000 ('84) and L40,000 ('85). Also agreed to reduce HRS worked by 20 HRS in 84h2 and by another 20 HRS in 85h1 (~ 1HR/WK, to 40 HRS/WK).	WB	SM/84/10+ OECD/83-84
83h2	3-yr wage agreement concluded. "Moderate", but retroactive wage increased granted.	WB	SM/85/127
84 FEB 16	"Once off" reform to incomes' policy introduced: limited SM points allowable to 4 points in each of 84h1 and 84h2. It proved a binding constraint only during 84h1 (which would have seen an 8 point increase).	SM	SM/85/127+ OECD/84-85
84	Hiring system reformed, so employers could hire employees without regard to their rank order, provided the proportion of such workers was a given small proportion. Later, it transpired that the system was not strictly adhered to.	Hire/Fire	WP/94/30



Data Sources and Definitions

Most of the raw quarterly data used in this paper were provided by the Bank of Italy (BoI), and were available as of April 1995. Exceptions include the capital stock and the fiscal variables (social security contributions and direct taxes), which were provided by the OECD, and exchange rate and oil price data which were provided by the IMF. As mentioned in the text, the main labor market aggregates (labor force, employment and unemployment) for Italy do not include those workers placed on the Wage Supplementation Fund (WSF). Hence, all figures used in the paper have been adjusted to include them, except where otherwise indicated.

The Italian authorities recently revised the main labor market aggregates from 1992q4 onwards. This created a problem of interpretation, since the dramatic changes evident in labor market data after 1991 could possibly be attributed to the data revisions. The BoI has produced revised figures for labor force, employment and unemployment going back to 1981, and it is these figures that are used in the paper (further revised to include the impact of the WSF). <sup>1/</sup> The revised figures indicated that the evident break in the series after 1991 was not caused by the data revisions themselves. However, in 1992q4 there is also an evident break in population data, and further revisions of the labor force statistics are likely as new census data are processed. Hence, the post-1991 results should be treated with caution.

The wage series utilized in this paper is wages in the manufacturing sector. Although an economy-wide aggregate would have been preferable, the manufacturing wage series goes back further in time and appears to track the economy-wide aggregate closely where the two overlap. The consumption wage is defined as the manufacturing wage deflated by the CPI, and the product wage is defined as the manufacturing wage deflated by the PPI. Although these definitions are at best proxies for the theoretically indicated concepts, it was attempted to provide corrections for any definitional imprecisions by including tax variables in the regressions--both social security contributions and direct taxes. Due to data limitations, it was not possible to decompose social security contributions into employer and employee components (at least at a quarterly frequency for the time-period under consideration).

---

<sup>1/</sup> The BoI revised series were spliced with the earlier series so as to obtain consistent time series back to 1975.



### Estimation and Testing of the Labor Market Model

All the series used in this paper were tested for stationarity utilizing augmented Dickey-Fuller (ADF) tests. Results indicated that all variables were integrated of order one, denoted as  $I(1)$ . This result held even for the product wage. The null hypothesis assumed the existence of a deterministic linear trend. Given these results, the equations finally selected for inclusion in the main model (the employment, wage-setting and labor force equations) were tested for cointegration. For each equation, the hypothesis of cointegration among the included variables failed to be rejected, and the residuals were found to be stationary using ADF tests. The cointegrating vectors were also estimated using the Johansen procedure, and were found to have the same signs as those estimated for the main model. When the full set of variables was tested for the existence of cointegrating vectors utilizing the Johansen procedure, the hypothesis that there existed 6-7 cointegrating vectors failed to be rejected.

The main model was estimated using three different procedures: equation-by-equation using ordinary least squares (OLS); a seemingly-unrelated regressions technique (SUR); and a three-stage least squares technique which took into account estimated contemporaneous correlations between the errors (3SLS+SUR). OLS estimates are known to be at least consistent when variables are  $I(1)$  and cointegrated--see Henry and Snower (1995) for further discussion of these and related topics. Interestingly, for the final specification of the main model, different estimation methods resulted in very similar results, provided that a full set of instruments was used in the 3SLS case. <sup>1/</sup> This result is probably related to the near diagonal nature of the residual variance-covariance matrix (which is reported in the main text). The results reported in the paper were obtained using the SUR procedure, which seemed somewhat advantageous from the computational point of view.

Finally, the individual equations of the main model were subjected to a series of tests additional to those reported in the main text, including further tests of serial correlation (LM tests with 4 lags), tests of normality (Jarque-Bera) and heteroskedasticity (ARCH tests with 4 lags). For each equation, the usual assumptions (no serial correlation, normality and homoskedasticity) failed to be rejected.

---

<sup>1/</sup> And variables such as wages and output were instrumented using lagged wages and output respectively. This procedure should successfully purge the biasing effects of endogeneity provided the error terms were serially uncorrelated. Tests failed to reject the hypothesis of no residual serial correlation.



Inference Reliability in the Presence of Nonstationarity

Although it is clear that estimating relationships involving nonstationary variables is technically correct in the presence of cointegration--in the sense that the estimated coefficients converge to the correct value--it is less obvious that this is also true for the standard errors of these coefficient estimates. The literature on this topic provides some support that this will be so for many, but not necessarily all, of the coefficients. In addition, almost all distributional results from the cointegration literature rely on large sample approximations, which may or may not be applicable to the actual sample lengths available.

To address some of these concerns, a monte-carlo simulation technique was employed to empirically calculate the distribution of the estimated coefficients. This included the mean and associated t-statistics, the minimum, median, and maximum, as well as various fractiles of the distribution. The specific technique utilized is known as the 'bootstrap', and works by resampling the estimated residuals a large number of times, shocking the model with the resampled residuals, and recomputing the variables of interest. This method is known to generate good approximations to the empirical distribution function of the estimated coefficients (or, indeed, to other statistical functions of interest).

The results of applying this technique are included in the table below. The first entry, for example, indicates that the coefficient of the first employment lag in the employment equation was estimated as 0.556 using standard regression methods (in this case, the seemingly-unrelated regressions' technique), which also reported a t-statistic of 6.6. Utilizing the bootstrap, the mean of the estimated coefficient is seen to be somewhat lower, at 0.4757, as is the corresponding t-statistic. However, the coefficient remains highly statistically significant, and in fact there is not a single replication among the 500 attempted which produced a coefficient estimate lower than 0.218.

Overall, the bootstrapped t-statistics tend to be somewhat lower, but the correction is in no case so large as to overturn a conclusion of statistical significance reached using the regression-based estimates, except for some quarterly-dummy coefficients, which have no policy significance. The one exception has to do with the effect of the real consumption wage on the labor force, whose statistical significance deteriorates to the point where the coefficient becomes suspect.



Italy – Bootstrapped Coefficient Estimates vs. Regression (SUR) Estimates  
(500 Replications)

	Regression Estimates		Bootstrapped Estimates								
	Mean	t-stat.	Mean	t-stat.	Min.	Fract05	Fract10	Median	Fract90	Fract95	Max.
<u>Employment</u>											
n{1}	0.5560	6.60	0.4757	5.63	0.2180	0.3309	0.3617	0.4779	0.5807	0.6014	0.7013
n{3}	0.1450	1.90	0.1452	1.87	-0.0970	0.0170	0.0466	0.1461	0.2419	0.2711	0.4355
wp	-0.1200	-3.20	-0.1351	-3.13	-0.2601	-0.2080	-0.1889	-0.1353	-0.0818	-0.0630	-0.0127
constant	-7.9100	-4.40	-9.3882	-4.37	-17.1641	-13.1284	-12.1857	-9.2565	-6.6996	-6.0105	-4.3732
time trend	-0.0040	-3.90	-0.0047	-3.86	-0.0084	-0.0068	-0.0062	-0.0046	-0.0032	-0.0028	-0.0016
q4{-2}	0.0070	2.80	0.0054	2.36	-0.0024	0.0019	0.0025	0.0054	0.0084	0.0091	0.0116
q4{-1}	0.0160	8.70	0.0155	7.93	0.0087	0.0123	0.0130	0.0156	0.0179	0.0189	0.0206
q4	0.0090	6.00	0.0098	6.06	0.0046	0.0072	0.0077	0.0099	0.0118	0.0122	0.0147
k	0.6600	4.00	0.8015	4.33	0.3210	0.5149	0.5755	0.7903	1.0496	1.1542	1.4077
r	-0.0700	-5.00	-0.0795	-5.90	-0.1200	-0.1024	-0.0962	-0.0786	-0.0632	-0.0577	-0.0327
SSC	-4.4900	-7.10	-4.6979	-6.86	-6.6648	-5.8667	-5.6037	-4.6548	-3.8610	-3.6682	-2.9161
SSC{1}	3.7600	5.10	3.7491	5.16	1.5911	2.5045	2.7463	3.7499	4.6548	4.9973	5.6525
SSC{3}	-1.4400	-3.70	-1.5284	-3.76	-2.4691	-2.1753	-2.0473	-1.5257	-1.0167	-0.8577	-0.1208
y	0.1580	5.40	0.1833	4.99	0.0801	0.1258	0.1372	0.1815	0.2308	0.2474	0.3026
<u>Wage Setting</u>											
n{3}	0.1870	3.30	0.2171	3.16	0.0264	0.1089	0.1301	0.2114	0.3078	0.3434	0.4378
wc{1}	0.7700	17.70	0.6938	8.47	0.3310	0.5576	0.5865	0.7001	0.7938	0.8150	0.8743
constant	-1.9600	-3.30	-2.2599	-3.25	-4.6152	-3.5108	-3.1762	-2.2088	-1.3814	-1.1654	-0.3917
time trend	0.0000	0.20	0.0001	0.26	-0.0008	-0.0004	-0.0003	0.0001	0.0006	0.0008	0.0016
q4{-2}	-0.0040	1.80	-0.0035	-1.79	-0.0097	-0.0069	-0.0062	-0.0034	-0.0011	-0.0004	0.0019
q4{-1}	-0.0010	-0.60	-0.0012	-0.54	-0.0083	-0.0048	-0.0040	-0.0011	0.0015	0.0021	0.0040
q4	-0.0050	-2.70	-0.0042	-2.42	-0.0095	-0.0071	-0.0065	-0.0041	-0.0020	-0.0014	0.0007
p	0.0500	1.10	0.0512	0.84	-0.1763	-0.0458	-0.0284	0.0508	0.1281	0.1517	0.2315
t1	-4.6800	-6.50	-4.7633	-6.33	-7.1614	-5.9331	-5.7098	-4.7679	-3.7987	-3.6038	-2.5141
t1{1}	4.5400	5.00	4.2664	4.52	1.5413	2.6643	3.1089	4.2378	5.4658	5.7939	7.6832
t1{3}	0.3000	0.10	0.2533	0.47	-1.7311	-0.6342	-0.3991	0.2580	0.9429	1.1110	1.7683
<u>Labor Force</u>											
n	0.9520	10.50	0.8396	8.29	0.5457	0.6620	0.7015	0.8390	0.9724	1.0021	1.1361
n{1}	-0.5050	-3.10	-0.3440	-2.21	-0.7839	-0.6069	-0.5429	-0.3467	-0.1418	-0.0898	0.1951
n{2}	-0.4340	-2.60	-0.4012	-2.64	-0.7922	-0.6516	-0.6022	-0.3990	-0.2091	-0.1611	0.1068
n{3}	0.2170	1.20	0.2107	1.33	-0.2702	-0.0385	0.0166	0.2070	0.4091	0.4714	0.7727
n{4}	-0.1470	-1.00	-0.1376	-1.00	-0.5877	-0.3610	-0.3086	-0.1446	0.0401	0.0932	0.2476
wc	0.0070	1.70	0.0718	1.14	-0.1265	-0.0361	-0.0112	0.0762	0.1537	0.1685	0.2397
l{1}	0.6640	5.80	0.6184	5.01	0.2642	0.4051	0.4606	0.6243	0.7726	0.8183	1.0381
l{2}	0.1030	0.70	0.0624	0.44	-0.5422	-0.1856	-0.1072	0.0654	0.2397	0.2915	0.4107
l{3}	-0.1830	-1.40	-0.1532	-1.21	-0.5687	-0.3636	-0.3207	-0.1545	0.0111	0.0430	0.4762
l{4}	0.2720	2.50	0.2424	2.24	-0.0962	0.0586	0.1045	0.2470	0.3756	0.4095	0.5582
constant	0.4500	0.80	0.3937	0.57	-1.7574	-0.7336	-0.5038	0.4225	1.2577	1.5070	2.5579
time trend	-0.0003	-2.30	-0.0004	-2.34	-0.0010	-0.0007	-0.0006	-0.0004	-0.0002	-0.0002	0.0002
q4{-2}	-0.0060	-2.10	-0.0040	-1.49	-0.0121	-0.0085	-0.0075	-0.0040	-0.0003	0.0004	0.0041
q4{-1}	-0.0110	-3.00	-0.0081	-2.11	-0.0195	-0.0147	-0.0129	-0.0082	-0.0031	-0.0016	0.0030
q4	-0.0060	-2.00	-0.0048	-1.71	-0.0140	-0.0093	-0.0082	-0.0048	-0.0010	-0.0001	0.0045
popw	0.000010	1.80	0.000007	2.30	-0.000001	0.000003	0.000004	0.000007	0.000011	0.000013	0.000020

Notes: n denotes employment, wc the consumption wage, wp the product wage, l the labor force, k business sector capital stock, r competitiveness, y real GDP, p productivity, WAP the working age (14–64) population and SSC the ratio of social security contributions to the wage bill (in index form). All variables, except SSC are measured in logarithms. Appendix II provides further details on data sources and definitions  
t-stat refers to the t-statistic, min. and max. to minimum and maximum respectively, and Fract05, Fract10,... to the 5 percent fractile, 10 percent fractile etc.



Bibliography

- Baussola, M. and Fiorito, R. (1994), "Regional unemployment in Italy: sources and cures." *Journal of Policy Modelling*, 16(5):497-527.
- Bean, C.R. (1992), "Identifying the causes of British unemployment." *London School of Economics Working Paper*, No. 276, August 1992.
- (1994), "European unemployment: A survey." *Journal of Economic Literature*, XXXII:573-619, June 1994.
- Bertola, J. (1990), "Job security, employment and wages." *European Economic Review*, 34:851-886.
- Bianchi, M. and Zoega, G. (1994), "Unemployment persistence: Does the size of the shock matter?" *Centre for Economic Policy Research Discussion Paper Series*, No. 1082, December 1994.
- Blanchard, O. and Jimeno, J.F. (1995), "Structural unemployment. Spain versus Portugal." *American Economic Review*, Papers and Proceedings, 85:212-18.
- Blanchard, O. and Quah, D. (1989), "The dynamic effects of aggregate demand and supply disturbances." *American Economic Review*, 79(4):655-73.
- Canziani, P. and Demekas, D.G. (1995), "The Italian public pension system: Current prospects and reform options." *IMF Working Paper Series*, WP/95/33, March 1995.
- Demekas, D.G. (1994), "Labor market institutions and flexibility in Italy: A critical evaluation and some institutional comparisons." *IMF Working Paper Series*, WP/94/30, March 1994.
- Erickson, C.L. and Ichino, A. (1992), "Wage differentials in Italy: Market forces, institutions, and inflation." *Innocenzo Gasparini Institute for Economic Research Working Paper Series*, Working Paper No. 34, November 1992.
- Fachin, S. (1991), "Is the employment function structurally unstable? An empirical test: Italian manufacturing industry, 1970-84." *Labor*, 5(1):175-214, Spring 1991.
- Ford, R. and Laxton, D. (1995), "World public debt and real interest rates." *IMF Working Paper Series*, WP/95/30, March 1995.
- Henry, S. and Snower, D. (1995), "The dynamics of European unemployment." *Mimeo*, December 14, 1995.
- International Monetary Fund, (1986), "Labor market flexibility." *Italy--RED, Appendix I, SM/86/135*, June 17, 1986.



- , (1991), "Italy: Wage determination and unemployment." *Italy--RED*, Appendix II, SM/91/12, Suppl. 1, January 22, 1991.
- , (1992), "Italy: Wage indexation and labor costs." *Italy--RED*, Appendix III, SM/92/6, Suppl. 1, January 24, 1992.
- , (1995), "Unemployment," *Italy - Background Economic Developments and Issues*, Annex II, SM/95/48, March 9, 1995.
- Jaramillo, F., Schiantarelli, F. and Sembenelli, A. (1991), "Are adjustment costs for labor asymmetric? An econometric test of panel data for Italy." *Boston University Industry Studies Program Discussion Paper Series*: No. 21:1-15, September 1991.
- Karanassou, M. and Snower, D.J. (1994), "The sources of unemployment persistence and responsiveness." *IMF Mimeo*, December 15, 1994.
- Layard, R. and Nickell, S. (1987), "Unemployment in Britain." In Bean, C., Layard, R. and Nickell, S. (eds), *The rise in unemployment*. T.J. Press Ltd., Padstow, Great Britain, 1987.
- Lazear, E.P. (1990), "Job security provisions and employment." *Quarterly Journal of Economics*, 105(3):699-726, August 1990.
- Lindbeck, A. and Snower, D.J. (1994), "How are product demand changes transmitted to the labour market?" *The Economic Journal*, 104:386-98, March 1994.
- de Luca, L. and Bruni, M. (1993), "Unemployment and labour market flexibility: Italy." *International Labour Office*, Geneva.
- Mazzocchi, G. (1981), "Unemployment in Italy and Europe in the 1980s." *Giornale degli Economisti e Annali di Economia* (Italy), 40:363-70, May-June 1981.
- Modigliani, F., Padoa Schioppa, F. and Rossi, N. (1986), "Aggregate unemployment in Italy, 1960-1983." *Economica*, Suppl., 53:S245-S273.
- Mohabbat, K.A. and Al-Saji, A.K. (1990), "Anticipated and unanticipated money growth and the rate of unemployment in Italy." *Rivista Internazionale di Scienze Economiche e Commerciali*, XXXVII(10-11):969-76.
- Newell, A. and Symons, J.S.V. (1987), "Corporatism, laissez-faire and the rise in unemployment." *European Economic Review*, 31:567-614.
- O.E.C.D., *Economic surveys: Italy*. Various Issues.
- , (1994), "The OECD Jobs study: Evidence and explanations, Part I: Labour market trends and underlying forces of change."



- , (1994), "The OECD Jobs study: Evidence and explanations, Part II: The adjustment potential of the labour market."
- , (1994), "The OECD Jobs study: Facts, analysis and strategy."
- Torelli, N. and Trivellato, U. (1989), "Youth unemployment duration from the Italian labour force survey: Accuracy issues and modelling attempts." *European Economic Review*, 33:407-415.
- Sims, C.A., "Macroeconomics and reality." *Econometrica*, 48(1980):1-49.
- Snower, D.J. (1990), "Demand and supply policies and unemployment: Policy implications of the insider-outsider approach." *Scandinavian Journal of Economics*, 1990:92[2]:279-303.
- , (1995), "Evaluating unemployment policies: What do the underlying theories tell us?" *IMF Working Paper Series*, WP/95/7, January 1995.
- Valli, V. (1983), "Rise of unemployment and employment adjustment policies in Japan, Italy and West Germany." *International Review of Economics and Business (Italy)*, 30:716-34, August 1983.
- Varian, H.R. (1984), "Microeconomic analysis." *W.W. Norton & Company, Inc.*, New York. 2nd edition, 1984.



