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**Persistence of relative unemployment  
rates across italian regions**

by

Barbara Pistoresi\*  
Marcello D'Amato\*\*

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\* Università degli Studi di Modena  
Dipartimento di Economia Politica  
Viale Berengario, 51  
41100 Modena (Italia)  
e - mail: [pistoresi@unimo.it](mailto:pistoresi@unimo.it)

\*\* Università degli Studi di Salerno  
Dipartimento di Scienze Economiche  
Via Ponte Don Melillo-  
84084 Fisciano (Sa)  
e - mail: [damato@unimo.it](mailto:damato@unimo.it)

*Abstract:* In this paper we present some preliminary evidence about regional unemployment rates in Italy. In particular we ask whether the finding that relative unemployment rates are short run persistent holds also for Italy. Pairwise cointegration tests and tests for common trends on relative unemployment rates allow us to reject this hypothesis. This leads us to question the view that the source of long run persistence of regional unemployment is uniquely aggregate in nature and due fluctuations in the aggregate natural rate of unemployment. Preliminary evidence is reported according to fluctuations in macroareas may be considered as a source of persistence at least as important as the aggregate source.

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\* **Very Preliminary and Incomplete.** Comments are welcome.

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## **1. Introduction**

The high persistence of unemployment in OECD countries and, particularly in European countries, is now an agreed on stylised fact (see for example Mitchell, 1995). The high persistence of aggregate unemployment may be related to aggregate labour market institutions, wage rigidity and labour force dynamics (see Bean, 1994 for a survey). However, the perspective focusing on the geographical dimension of the labour market in a given country may be considered at least as important as the aggregate perspective since, on the one hand the aggregate sources of persistence can be expected to have different effects at the regional level and, on the other hand, regional labour markets can be characterised by local sources of persistence.

Focusing on the deviations of the variables that characterise the labour market from the aggregate counterpart, the geographical perspective allows to give account of regional evolutions in different regions or states. Blanchard and Katz (1992, p.1, henceforth BK), studying US regional evolutions, describe a typical stylised fact to be explained in this perspective as follows: "In 1987, the unemployment rate in Massachussets averaged 3.2 percent points below the national rate. Only four years later, in 1991, it stood at 9.0 percent, more than two points above the national rate".

Given this pattern of relative regional unemployment rates, that is, any deviation of the regional unemployment level from the national counterpart, can be considered as transitory, the natural question to answer is: how long does it take a regional labour market to return to normality (national natural rate)? The analysis of

the persistence of regional labour markets disequilibria and the explanation of low persistence in relative unemployment require, in turn, to answer four questions which can be stated in the same words by the authors cited above: “when a typical U.S. state [...] has been affected by an adverse shock to employment, how has it adjusted? Did wages decline relative to the rest of nation? Were the jobs created to replace those shocks destroyed by the shock? Or did workers move out of the state?”

To answer these questions BK firstly draws a general picture of state evolutions by focusing on three other stylized facts which, to some extent, may be used as a benchmark to describe regional labour markets in different economies. Those stylised facts are reported here for future comparisons in (almost) their own words (BK, p.2):

1) Rather than leading to fluctuations around trends, *employment shocks* typically have permanent effects. A state that experiences an acceleration or a slowdown in growth can expect to return to the same growth rate, but on a permanently different path of employment. This implies that relative employment, defined as the ratio of regional employment to the national one has a permanent long run component.

2) *Relative unemployment*, instead, exhibits no trend: state fortunes are reasonably blind and states move from above to below the national unemployment rate and viceversa.

3) *Relative wages* exhibit no trend, being characterised by steady convergence.<sup>1</sup>

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<sup>1</sup> This is a fact also documented by Barro and Sala-i-Martin (1991) using per capita disposable income rather than wages. This is an important remark since, as we will see, we will analyse the average compensation per employee in the region as a proxy for wages.

The conclusions drawn by BK is that booms and slumps for states are best described as transitory accelerations or slowdowns of employment growth. These transitory shocks to relative employment growth affect permanently employment in level and induce transitory fluctuations in relative unemployment and wages. Labour mobility is found to be the major adjustment mechanism rather than job creation or job migration to absorb regional shocks. In turn, labour mobility reacts to unemployment rather than to wage differentials.

It is safe enough to argue that the questions put forward by BK are very important questions whose scope goes beyond regional economics and extends to the dynamic behaviour of countries in a trade bloc. Decressin and Fatas (1995, henceforth DF) take this view and investigate regional labour market dynamics in Europe, also comparing the results to those obtained for the US. Their work, as explicitly stated by the authors, heavily draws on the stylised facts and the model used by BK to analyse US states. However, applying BK's model to interpret European regional dynamics may seem to be a hard work if the stylised facts listed above are not the same in the two areas. To face this problem DF propose the following strategy: "whenever we compare how a typical region in Europe and a typical state in US adjust to a region specific labour demand shock we adapt the findings of Blanchard and Katz (1992) to our result for Europe". The main differences may be summarised as follows:

- 1) In Europe, unlike in the US, the proportion of yearly changes in employment which tends to be common across regions is considerably smaller than the proportion of region specific changes;

2) region-specific shocks to employment, although similar in initial size, have much stronger long-run effects in the US;

3) absolute regional unemployment rates are more persistent in Europe than in the US (see fig. 9 p.1642). However the result about the larger degree of persistence in Europe does not imply a high degree of persistence in the relative unemployment rates: “the common shocks have a permanent effect in Europe” (DF p.1642)), while “regional relative unemployment rates in Europe return to their mean fairly quickly” (DF p.1640). An alternative way to put this finding is that, while the aggregate natural rate of unemployment is highly persistent, the adjustment to the regional natural rate of unemployment in Europe is fairly quick (actually quicker in Europe than in the US, see DF. fig. 8, p.1641);

4) As far as the joint behaviour of relative employment, unemployment rate and participation rate, DF finding is that the low persistence in relative unemployment rates in European regions, rather than due to labour migration as in the case of US, is explained by movements in and out of the labour force in response to changes in regional fortunes.

The finding by DF for Europe may fail to hold for regions in single European countries. Bentolilla and Jimeno (1995, henceforth BJ) address this issue for Spain. They also exploit the basic framework introduced by BK to model regional labour market dynamics in Spain. Their findings may be summarised as follows:

1) regional wages, relative unemployment and participation rates are very persistent in Spain, while employment growth rates are not (BJ, p.5);

2) any positive shock at regional relative employment level does not trigger important reply in migration and participation. Since neither migration, nor participation respond much in Spain, unemployment bears a significant fraction of the adjustment, accounting for about one third of the change in employment after three years (BJ, p. 8).

It can be noticed that the results about the persistence of the variables characterising the Spanish labour market are remarkably different from the results obtained by DF for European regions the main difference being given by the dynamic behaviour of relative unemployment rates. However, these conflicting outcomes, rather than sound facts may be the results of prior (statistical) models imposed to (and not rejected in the testing route by) the data. We will try to argue that most of the conflict can be explained by the fact that, differently from DF, BJ define relative unemployment as the difference between the regional level of a given variable less the national counterpart. These alternative definitions of "relative variables" imply different representations for the underlying process of the labour market as it will be argued in a moment.

Before pointing out these differences in modelling labour market dynamics, however, let us rephrase the main properties of the models and stylised facts reported above. In particular, keeping the aggregate natural rate of unemployment as reference, the findings of the studies reviewed above may be further synthesised in a different and, we believe, more interesting way. BK argues convincingly that regional fortunes in the US alternate around a national natural level of unemployment: the difference between each state level of unemployment and the national counterpart is stationary,

that is  $I(0)^2$ . This is equivalent to say that regional unemployment rates, though  $I(1)$  in levels, share a common trend that can be defined as the US natural rate of unemployment. At the state level, any departure from the national natural level is adjusted by triggering migration from one state to another.

When the framework adopted by BK is applied to the case of European regions the result is different (but not that much): the argument in DF is that there is still a persistent component in the series of regional unemployment that can be defined as the European natural rate of unemployment but the shock to this variable has different effects in different European regions. To clarify this point, consider DF's strategy to construct relative unemployment rates: since the deviation from the aggregate mean turns out to be highly persistent in the data, a simple way to reduce the degree of persistence in the relative unemployment rates is to regress the regional unemployment on the European counterpart and take the residuals as the definition of relative unemployment rates. The main points to be stressed about these regressions are:

- 1) the regression coefficient are significantly different from one region to another and different from one in value, (see the list of  $\delta$ s the Table A1 in DF, p.1650).
- 2) these regressions can be seen as a first step regression in the Engle and Granger procedure, and the estimated coefficients as cointegrating coefficients.

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<sup>2</sup> BK p.13 conclude "Thus, in contrast to similar analysis of aggregate unemployment rates for the United States and other countries, relative unemployment, relative unemployment rates for the US states return to their mean relatively quickly after a shock. This moderately rapid return to the mean implies that differences between state average unemployment rates over periods of 20 or so years mostly reflect differences in underlying state means, rather than persistence of unemployment deviation.". The argument relies on a region specific natural rate of unemployment which is modelled as a region specific intercept term in eq. (3) p.12. *This implies that any source of persistence in the regional unemployment rate is aggregate in nature.* If the regional unemployment rates in levels are  $I(1)$  the aggregate source of persistence is a common trend. This common trend is referred to as the aggregate natural rate of unemployment in the text. Incidentally it can be noticed that O. Blanchard contributed with L. Summers to the explanation of the aggregate source of persistence in european unemployment in a famous paper, (1986).



Their results can be rephrased in the following way: pairwise cointegration across regional unemployment rates in Europe implies the existence of a unique common trend across the series but the effect of a shock to this long run component is different across regions.<sup>3</sup> The implication of this modelling strategy is that it allows to maintain for Europe the picture drawn by BK for regional evolutions in US: one common trend (due to pairwise cointegration) drives all the regional unemployment rates, that is the source of persistence in regional unemployment rates in levels is considered to be aggregate in nature. Any deviation from a region specific natural rate of unemployment (region specific constant in eq 9, DF, p.1641) is soon absorbed (actually sooner than in the US!). The only difference is that in Europe the labour market adjustment works through labour participation rather than migration.

BJ, instead, find that relative unemployment rates in Spanish regions are  $I(1)$ , i.e. regional unemployment rates in levels do not cointegrate  $(1, -1)$  to the national counterpart. This implies that there is no common trend across regional unemployment rate and that there is no evidence for an aggregate natural rate of unemployment in Spain driving the long run dynamics at the regional level.

As argued above, we consider the dynamic properties of relative unemployment rates as a crucial feature to draw a reasonable picture of regional evolutions in Italy: in the absence of an aggregate natural rate of unemployment the stylised facts depicted by BK about regional evolutions change dramatically: the idea

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<sup>3</sup> DF, p.1631 state that in response to a region specific labour demand shock “both in Europe and the US the unemployment rate moves to a small extent and transitorily, suggesting the presence of a region specific natural rate of unemployment”. Though not explicitly stated, it seems that the concept of a region specific natural rate of unemployment is referred to the region specific constant term in the univariate process for relative unemployment, (see DF, p. 1640, eq. 9). A region specific constant term implies a region specific average in relative unemployment and may be interpreted as a region specific natural rate of unemployment to the extent that this is a deterministic concept. In the text we consider the natural rate of unemployment as a stochastic trend.

that regional fortunes alternate does not hold any more, labour markets turn out to be geographically segmented and a different model is requested to give account of this segmentation.

After the discussion above, it should be clear that a prerequisite for the analysis of regional evolution in Italy should be the provision of a clear evidence about the nature of relative unemployment rates. The aim of this paper is to offer some preliminary evidence about regional unemployment rates in Italy to check if the general framework introduced by BK for the US and applied by DF to interpret regional evolutions in Europe also holds for Italy. In particular we will try to address the following question: is it true that relative unemployment rates in Italy revert to their specific mean fairly quick? Equivalently: is it true that the source of persistence in regional unemployment in Italy is aggregate in nature? To answer this question we will describe the dynamic properties of regional unemployment rates in levels and relative unemployment rates.

The rest paper is organised as follows: in section 2 we will perform ADF tests on regional unemployment rates in levels and on relative unemployment rates. In section 3 we will perform dynamic principal component analysis to count up the number of long run components, to test the hypothesis that a unique common trend across regional unemployment rates exists and is responsible for any observed persistence in these series. Section 4 concludes.

## **2. The dynamics of regional unemployment rates in Italy**

The data are taken from Prometeia regional data set, see Prometeia (1994) for further details. We will analyse unemployment rates disaggregated according to 18 regions (aggregating Piemonte and Valle d'Aosta and Abruzzo and Molise).

Figure 1 reports unemployment rates in levels experienced by Northern regions (1959-1993). Figure 2 reports unemployment rates in levels experienced by regions in Centre Italy (1959-1993). Figure 3 reports unemployment rates in levels experienced by Southern regions (1959-1993). In each case the national unemployment rate is also reported. It can easily be seen as unemployment rates in Northern regions are steadily below the national rate (except few cases like Veneto in the early 60s). Regions in central Italy lie around the national rate (except for Marche, whose rate lies below). Southern rates lie steadily above the national rate.

These figures at their face value plot well known stylised facts: regional unemployment rates have different means and exhibit a high degree of persistence (long swings). Figure 4 plots the regional unemployment rates at different years. The pattern of the data, that is the existence of a positive relation between unemployment rates at different years is again consistent with the presence of a high degree of persistence in regional unemployment levels.

To provide further evidence of high degree of persistence we tested for the degree of integration in the series running ADF regressions in each series. Table 0 reports DF and ADF tests for regional unemployment rates: the null hypothesis of unit root cannot be rejected for all regions. The conclusion is that regional unemployment rates contain a random walk component implying that any shock (either transitory or permanent) to the series is persistent.

Pursuing the aim of the paper we have now to provide evidence about the source of persistence in regional rates. As we have seen in the introductory section this persistence may be considered either due to aggregate shocks (as assumed by BK and DF) or due to regional specific shocks (as found by BJ for Spanish regions). To this aim let us move now to compute relative unemployment rates. BK define relative unemployment rate as  $u_{it} = U_{it} - U_{mt}$ , where  $U_{it}$  is the regional unemployment rate and  $U_{mt}$  is the national unemployment rate. This definition of relative unemployment rate would restrict regional rates to cointegrate to national counterparts according to the cointegrating vector (1,-1). This would imply the existence of a unique identical common trend in the regional rates as the unique source of persistence.

However, following DF, we decide to test firstly for the presence of cointegration without restricting the cointegration vector to be (1,-1) by running pairwise regressions between regional rates and national counterpart and running a CRDW (Sargan and Bhargava cointegration test) on the residuals:  $u_{it} = U_{it} - \delta_i U_{mt} - \alpha_i$ . Even in this case the presence of cointegration would imply the presence of one common trend driving regional unemployment. Table 1 reports the results: we can reject the null of cointegration in 14 cases out of 18. The regional unemployment rates that cointegrate to the national rate are: Liguria, Toscana, Umbria and, on the borderline, Marche. The evidence collected up to this point does not necessarily contrast the finding in DF (see note 18, p. 1639): they also find absence of cointegration in the case of Italian regions, but due to lack of power of these tests they prefer to stick to their prior of cointegration, that is low degree of persistence in relative unemployment rates. Since this hypothesis implies that the source of persistence in regional unemployment rate is uniquely due to aggregate

shocks in the unemployment rates and since we consider this latter implication as unpalatable when referred to Italian regions, we decide to further inspect this point by testing the number of common trends in regional unemployment rates by using a different approach: dynamic principal components method.

### **3. Common Trends in regional unemployment rates**

In this section we perform dynamic principal component analysis (introduced by Forni- Reichlin, 1996) on regional unemployment rates to count up the number of common shocks and their contribution, at each frequency in terms of explained total variance of unemployment rate vector. In particular, at zero frequency, the number of principal component necessary to explain at least 95% of total variance gives indication for the number of common permanent component or common stochastic trends in regional series (See Forni-Reichlin 1995). If the hypothesis of one common trend cannot be rejected we are in the case assumed by DF: the source of long run persistence is aggregate in nature and regional unemployment rates are driven by aggregate disturbances in the long run. Furthermore, relative unemployment rates return to the region specific mean (regional natural rate of unemployment) fairly quickly.

If idiosyncratic long run elements dominate for each region then we would expect to find  $n$  common permanent parts (or equivalently  $n$  common trends) for  $n$  regions. More generally the presence of a high number of common trends implies that long run persistence in regional unemployment rates cannot be reduced to an

aggregate source. (See Forni and Reichlin, 1995 and D'Amato and Pistoiesi, 1996 for further details on dynamic principal components). Figure 5 plots the dynamic principal components at each frequency for 18 regions. Checking the number of common components at zero frequency we notice that at least 3 common permanent components (trends) are necessary to explain 90% of total variance at that frequency.

It can also be noticed that the first common trend explains only 0.6 of the total variance at zero frequency, this allows us to reject the hypothesis of the existence of 1 common trend in regional unemployment rate, necessary to sustain the modelling approach used by BK and DF.

The rejection of the hypothesis of a unique common trend across 18 Italian regions induces us to investigate the hypothesis that localised long run shocks may be important to explain long run dynamics in the regional unemployment series. This would properly require an entire paper of its own and is postponed to future work.

However, partial evidence supporting this view is provided by Figure 6 and 7 that plot the dynamic principal components at each frequency for the following macroareas: northern regions + Emilia and Toscana, and Southern regions (see fig. 3 for the definition of this aggregate). Checking the value of the principal components at zero frequency it can be noticed that, in the first case 2 common permanent components (common trends) are enough to explain more than 0.90 of the total variance at that frequency. In the case of Southern regions 2 components are enough to explain about 0.9 of the total variance at zero frequency. In both cases the first common permanent shock explains 0.8 of the total variance of regional unemployment vector in the relevant aggregate. As a first approximation we rely on intuitive argument to identify each of the shock: the high importance of the first common trend

in the sub aggregates suggests us that it cannot be identified as the national (aggregate) shock because such an high value would have induced cointegration results in the tests performed in the previous section.

Consequently, as a first approximation we can conclude that the main source of long run persistence in unemployment rates seem to be related to shocks hitting macro-areas. The issue of the source of the shock in each macroarea merits further analysis to be addressed in a more formal framework and is postponed to future work.

#### **4. Conclusions**

In this paper we provide an exploratory analysis of the regional unemployment rates in order to test if the hypothesis of mean reverting relative unemployment rates necessary to adopt the framework introduced by Blanchard and Katz (1992) can be used to give account of regional evolutions in Italy. In particular we tried to answer the following question: is it true that reversion of relative unemployment rates in Italy to their specific mean (region specific natural rate of unemployment) is fairly quick? In other words: is it true that the source of long run persistence in regional unemployment in Italy is aggregate in nature?

To answer these questions we exploit the restrictions that the hypothesis of mean reversion of relative unemployment set on the long run joint behaviour of regional unemployment rate in terms of common trends. Tests for pairwise cointegration and tests for the presence of common trends across regional unemployment series allow us to reject the hypothesis of cointegration. These findings

support our priors: the aggregate source of long run persistence in the series of regional unemployment (the national natural rate) cannot be considered as the unique source of such dynamics within regional labour markets in Italy. This prevents us to adopt the compact framework used by Blanchard and Katz (1992) to interpret regional evolutions in Italy. The most important issue here is the identification of the shocks operating at regional level and is left as a task for future work.



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**Table 0** Stationarity tests for regional employment ( $N$ ), unemployment rate ( $U$ ) and wage ( $W$ ).

Region	CONSTANT INCLUDED			CONSTANT AND TREND INCLUDED		
	$\log(N)$ ADF (lags)	$U$ ADF (lags)	$\log(W)$ ADF(lags)	$\log(N)$ ADF (lags)	$U$ ADF (lags)	$\log(W)$ ADF(lags)
Piemonte-Valle d'	-2.01 (1)	-0.96 (0)	-3.54 (1)	-2.37 (1)	-2.16 (1)	-0.068 (0)
Aosta						
Lombardia	-1.53 (1)	-2.31 (1)	-0.66 (1)	-2.81 (1)	-3.05 (1)	-0.047 (0)
Trentino	-0.18 (1)	-1.88 (0)	-0.75 (1)	-1.70 (1)	-1.84 (1)	-1.93 (1)
Veneto	0.21 (0)	-1.87 (1)	-0.60 (1)	-2.00 (0)	-2.16 (1)	-1.79 (1)
Friuli	-1.78 (0)	-1.57 (0)	-0.83 (1)	-1.80 (0)	-2.29 (0)	-2.36 (1)
Liguria	-2.18 (0)	-1.14 (0)	-0.67 (1)	-1.56 (0)	-3.52 (0)	-2.50 (1)
Emilia	-0.83 (0)	-1.72 (0)	-0.76 (1)	-1.70 (0)	-1.75 (0)	-2.16 (1)
Toscana	-0.81 (0)	-1.17 (0)	-0.71 (1)	-1.37 (0)	-1.88 (0)	-2.31 (1)
Umbria	-1.91 (1)	-1.77 (0)	-0.88 (1)	-1.09 (1)	-2.17 (0)	-1.76 (1)
Marche	-1.65 (0)	-1.54 (0)	-0.86 (1)	-1.41 (0)	-2.27 (0)	-1.94 (1)
Lazio	0.45 (0)	-1.38 (1)	-0.69 (1)	-1.83 (0)	-2.71 (0)	-2.16 (1)
Abruzzo-Molise	-2.29 (1)	-1.59 (0)	-0.81 (1)	-1.97 (0)	-2.81 (0)	-1.70 (1)
Campania	-0.81 (0)	-1.16 (1)	-0.96 (1)	-1.27 (0)	-2.18 (0)	-1.85 (1)
Puglia	-0.61 (0)	-0.66 (0)	-0.64 (1)	-1.87 (0)	-2.14 (0)	-1.63 (1)
Basilicata	-2.30 (0)	-1.32 (0)	-0.96 (1)	-1.64 (0)	-2.82 (0)	-0.95 (1)
Calabria	-2.72 (0)	-0.87 (0)	-1.00 (1)	-1.91 (0)	-2.94 (1)	-0.74 (1)
Sicilia	-0.68 (1)	-0.81 (1)	-1.02 (1)	-1.64 (0)	-2.46 (1)	-1.40 (1)
Sardegna	-0.12 (0)	-0.77 (0)	-0.68 (1)	-1.76 (0)	-1.86 (0)	-1.59 (1)

Notes: Dickey-Fuller regression with constant, critical values: 5% = -2.96. Dickey-Fuller regression with constant and trend, critical values: 5% = -3.55. In brackets (.), the number of lags in the ADF regression (significance level 5%).

**Table 1** Regression of regional unemployment rate

Region	$\delta_i$	$R^2$	DW
Piemonte- Valle d'Aosta	0.83 (0.04)	0.90	0.422
Lombardia	0.43 (0.06)	0.58	0.372
Trentino	0.079 (0.08)	0.024	0.418
Veneto	0.37 (0.079)	0.41	0.296
Friuli	0.39 (0.10)	0.30	0.309
Liguria	0.79 (0.046)	0.89	1.34
Emilia	0.24 (0.06)	0.31	0.443
Toscana	0.76 (0.03)	0.94	0.946
Umbria	0.70 (0.07)	0.77	1.01
Marche	0.55 (0.04)	0.88	0.778
Lazio	0.75 (0.05)	0.83	0.624
Abruzzo-Molise	0.82 (0.05)	0.85	0.541
Campania	2.07 (0.10)	0.91	0.420
Puglia	1.45 (0.06)	0.94	0.575
Basilicata	1.88 (0.13)	0.86	0.619
Calabria	2.11 (0.13)	0.88	0.351
Sicilia	2.23 (0.12)	0.90	0.365
Sardegna	2.02 (0.09)	0.93	0.267

Notes: National unemployment rate ( $U_n$ ), regional unemployment rate ( $U_i$ ), relative unemployment rate ( $u$ ) in the regression  $U_{it} = \alpha_i + \delta_i U_{nt} + u_i$ . DW: Durbin Watson. CRDW (cointegration test due to Sargan and Bhargava) critical value = 0.72 ( $n = 2, T = 50$ ).

**Table 2** Stationarity tests for relative employment growth ( $n$ ), relative unemployment rate ( $u$ ) and relative wage ( $w$ )

Region	Variable: $n$ DF-ADF (lags)	Variable: $u$ DF-ADF (lags)	Variable: $w$ DF-ADF(lags)
Piemonte-Valle d'	- 4.32 (0)	- 2.55 (1)	- 3.54 (1)
Aosta			
Lombardia	- 3.97 (0)	- 3.88 (1)	- 2.48 (0)
Trentino	- 4.40 (0)	- 2.26 (2)	- 1.60 (0)
Veneto	- 4.75 (0)	- 2.39 (1)	- 1.40 (1)
Friuli	- 6.41 (0)	- 2.40 (0)	- 1.40 (1)
Liguria	- 5.71 (0)	- 3.95 (0)	- 1.82 (1)
Emilia	- 5.87 (0)	- 2.45 (1)	- 3.67 (0)
Toscana	- 7.74 (0)	- 3.21 (0)	- 2.15 (0)
Umbria	- 3.78 (0)	- 2.82 (0)	- 1.9 (0)
Marche	- 7.99 (0)	- 3.09 (0)	- 3.26 (0)
Lazio	- 5.49 (0)	- 2.95 (1)	- 2.02 (2)
Abruzzo-Molise	- 5.37 (1)	- 2.80 (0)	- 3.27 (2)
Campania	- 5.94 (0)	- 3.43 (1)	- 2.16 (0)
Puglia	- 6.38 (0)	- 2.25 (0)	- 2.42 (0)
Basilicata	- 6.03 (0)	- 3.06 (0)	- 2.18 (0)
Calabria	- 7.54 (0)	- 2.49 (0)	- 2.18 (0)
Sicilia	- 5.24 (0)	- 2.30 (1)	- 2.07 (0)
Sardegna	- 7.59 (0)	- 3.20 (0)	- 2.96 (0)

Notes: DF and ADF tests on the residual of the regressions in Table 1:  $n$ ,  $u$ ,  $w$ . Dickey-Fuller regression is without constant ( $n$ ,  $u$ ,  $w$  are zero-mean variables). Critical values: 10% = - 1.61, 5% = - 1.95 and 1% = - 2.623. In brackets (.), the number of lags in the ADF regression (significance level 5%).

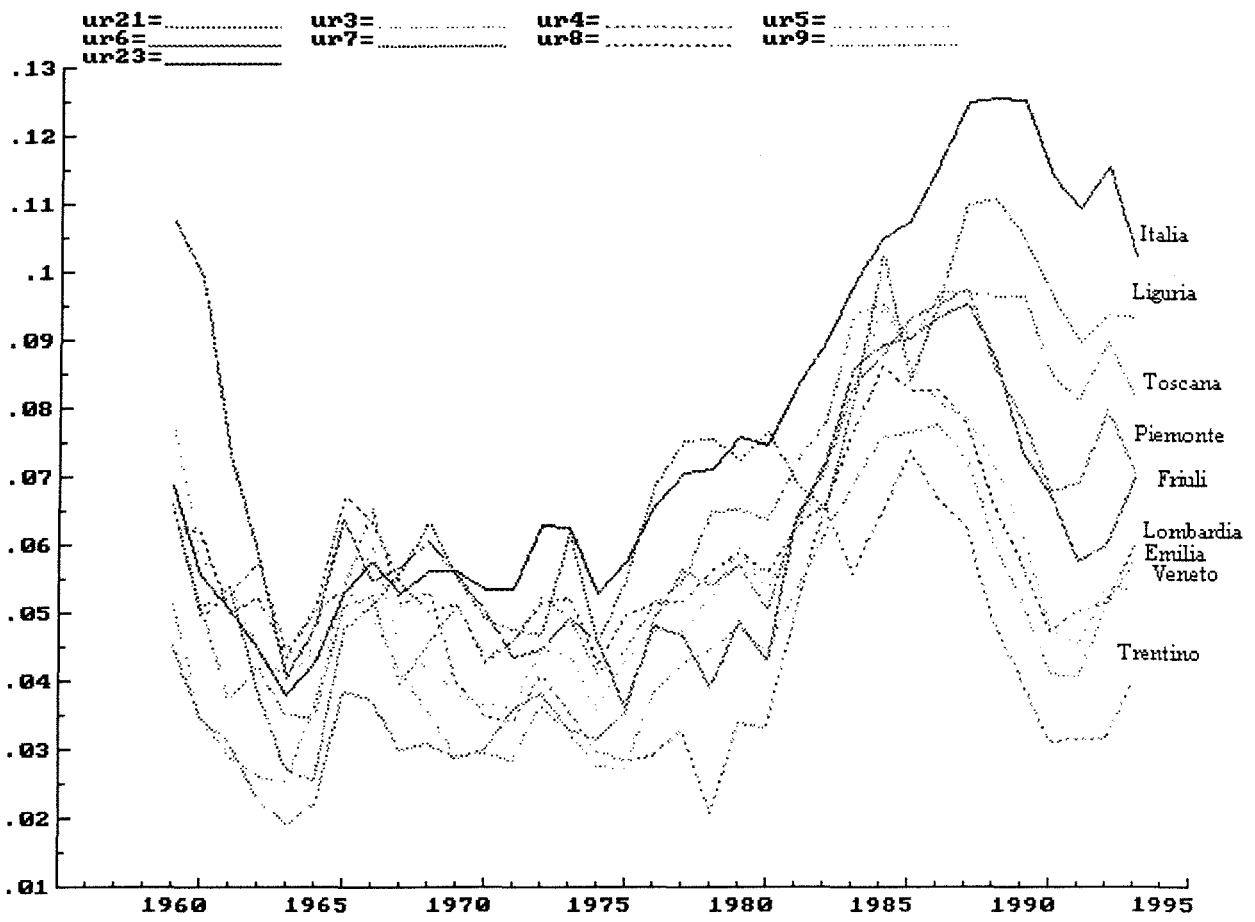


FIG. 1

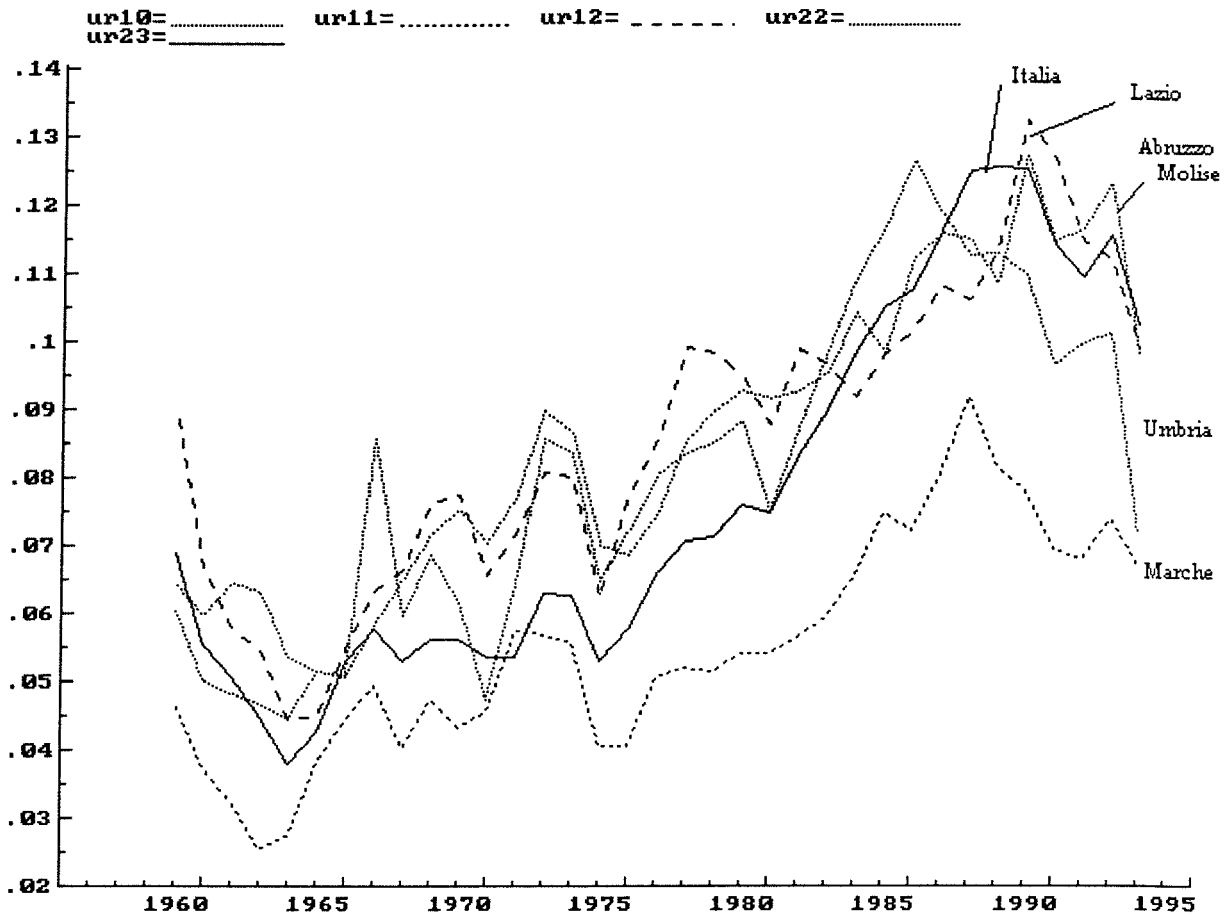


Fig. 2

ur15= ..... ur16= ..... ur17= ..... ur18= .....  
ur19= ..... ur20= ..... ur23= .....

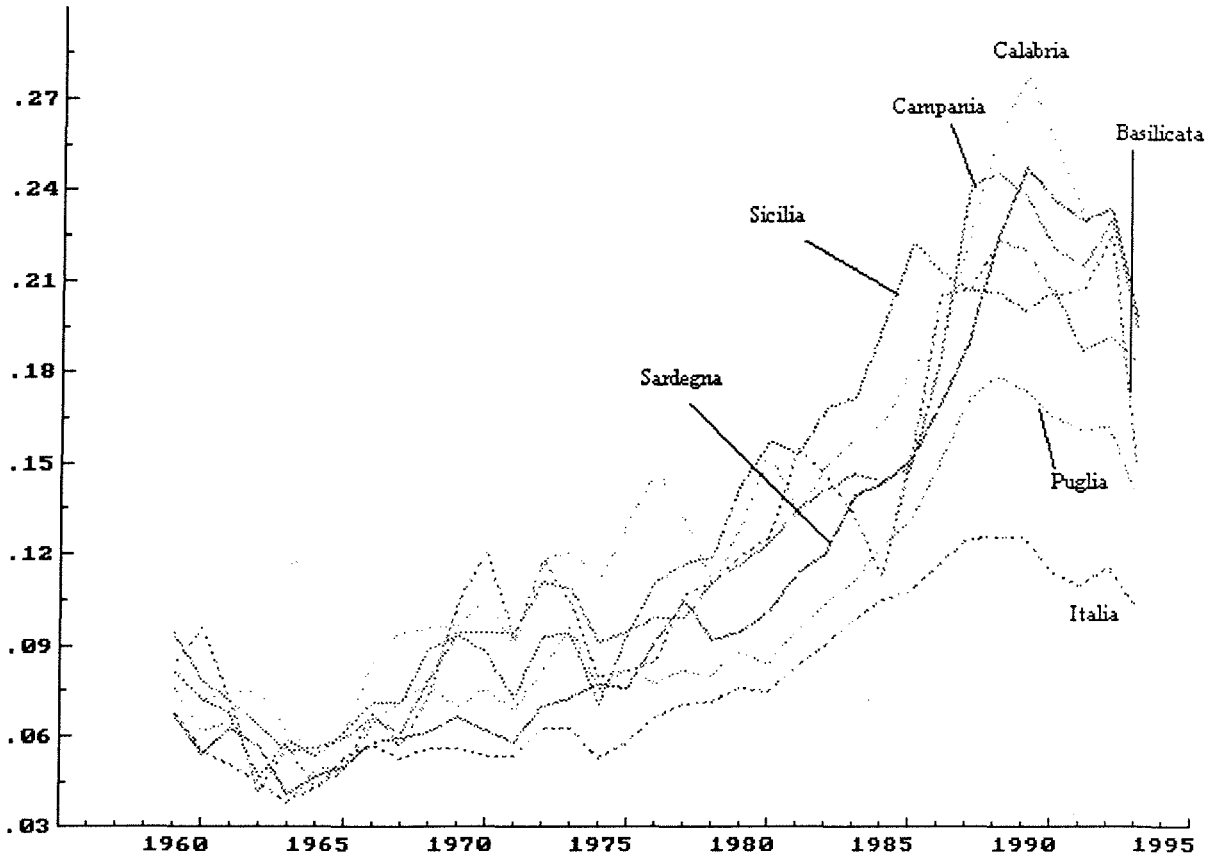


FIG. 3



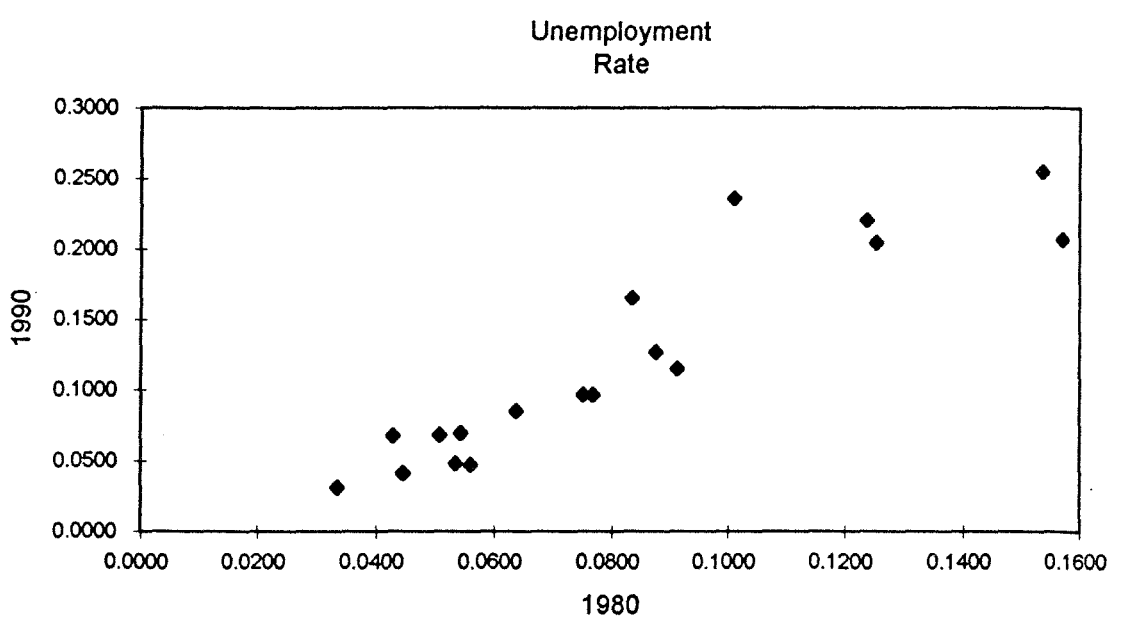
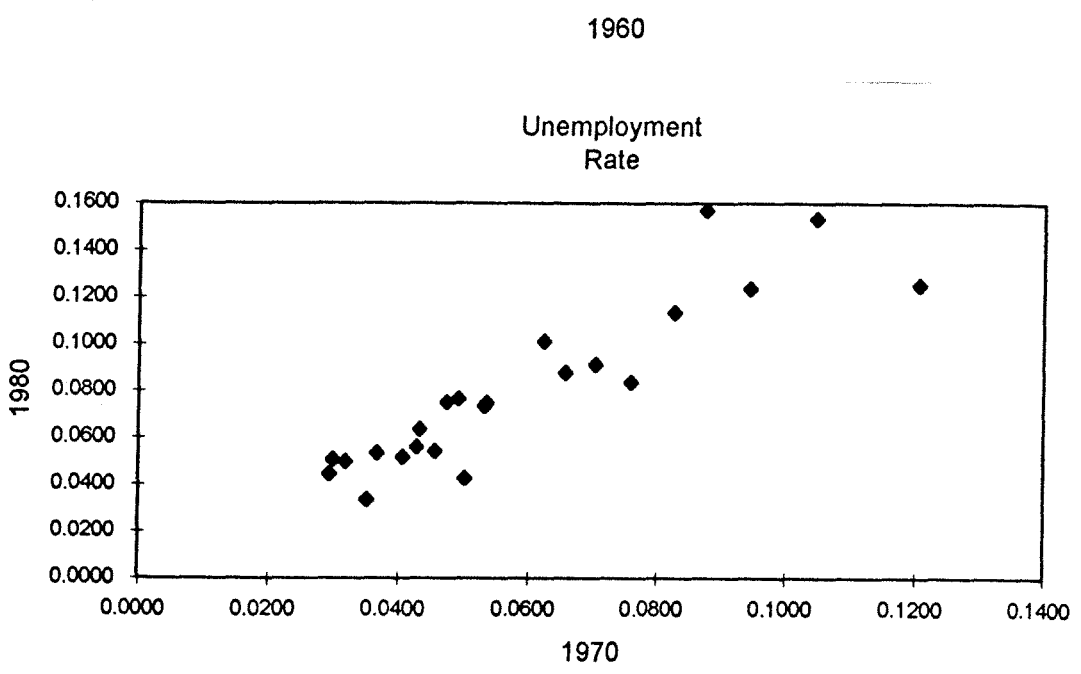
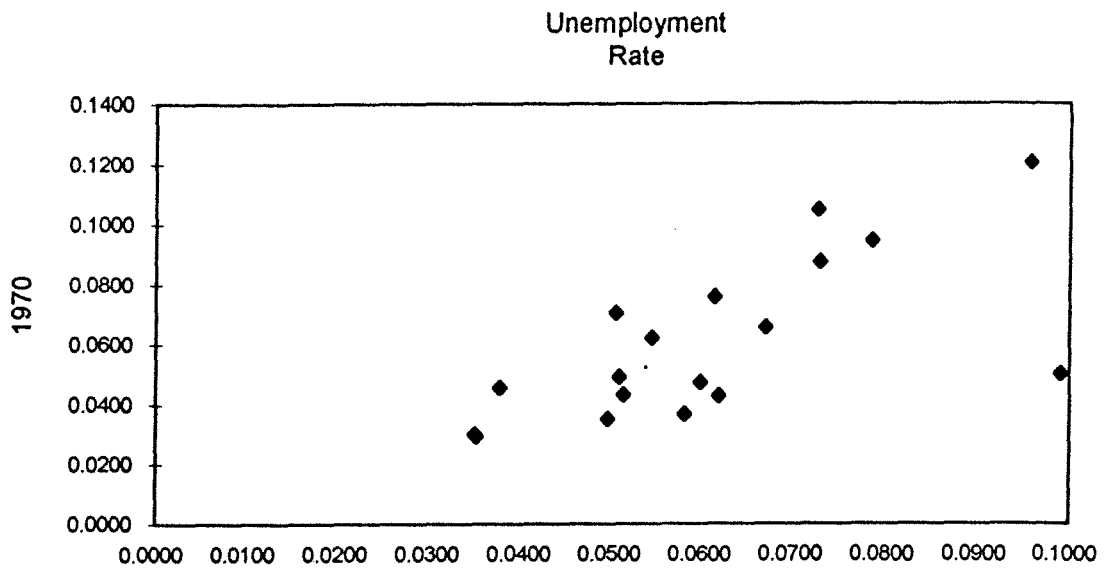


FIG 2

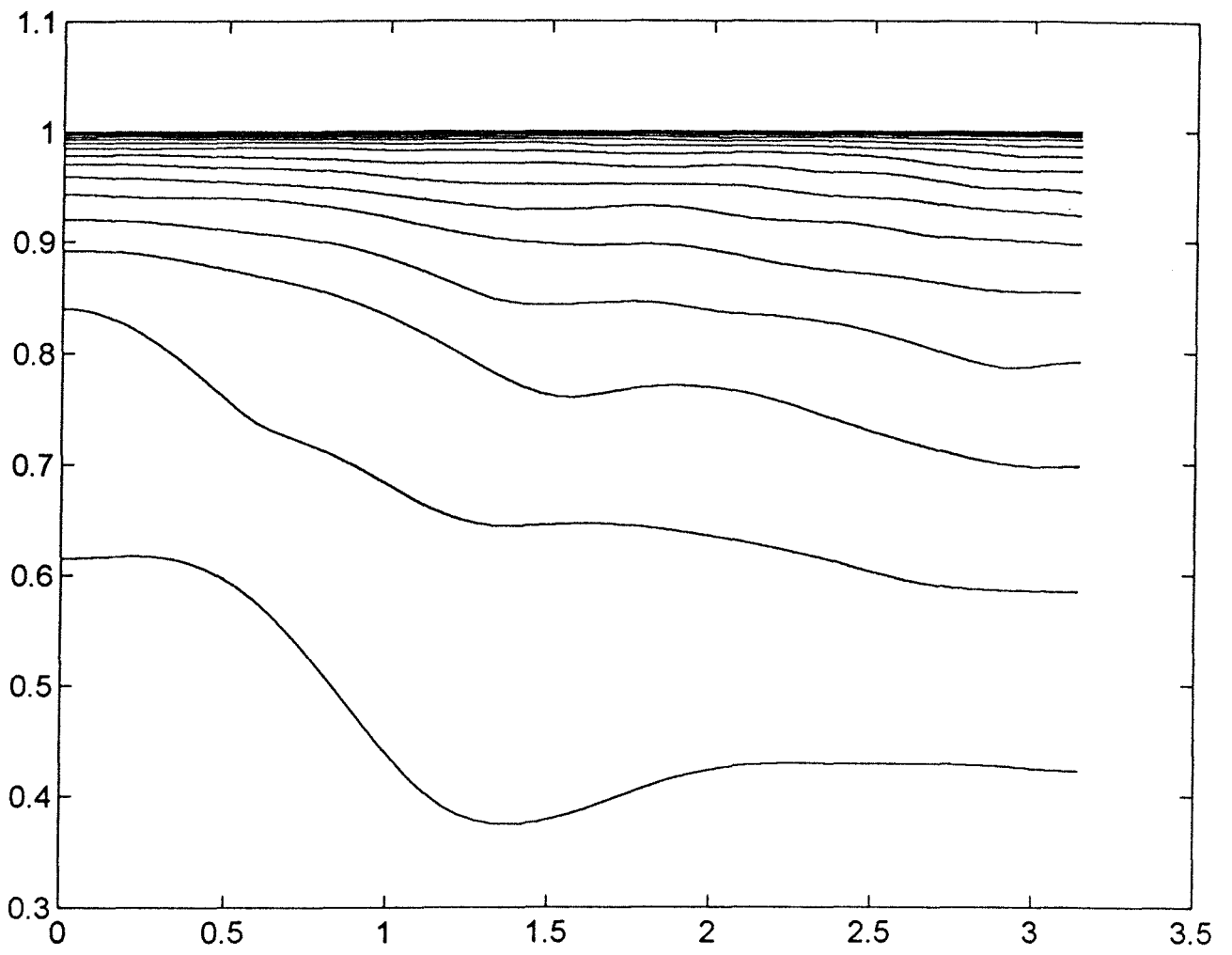


FIG 5

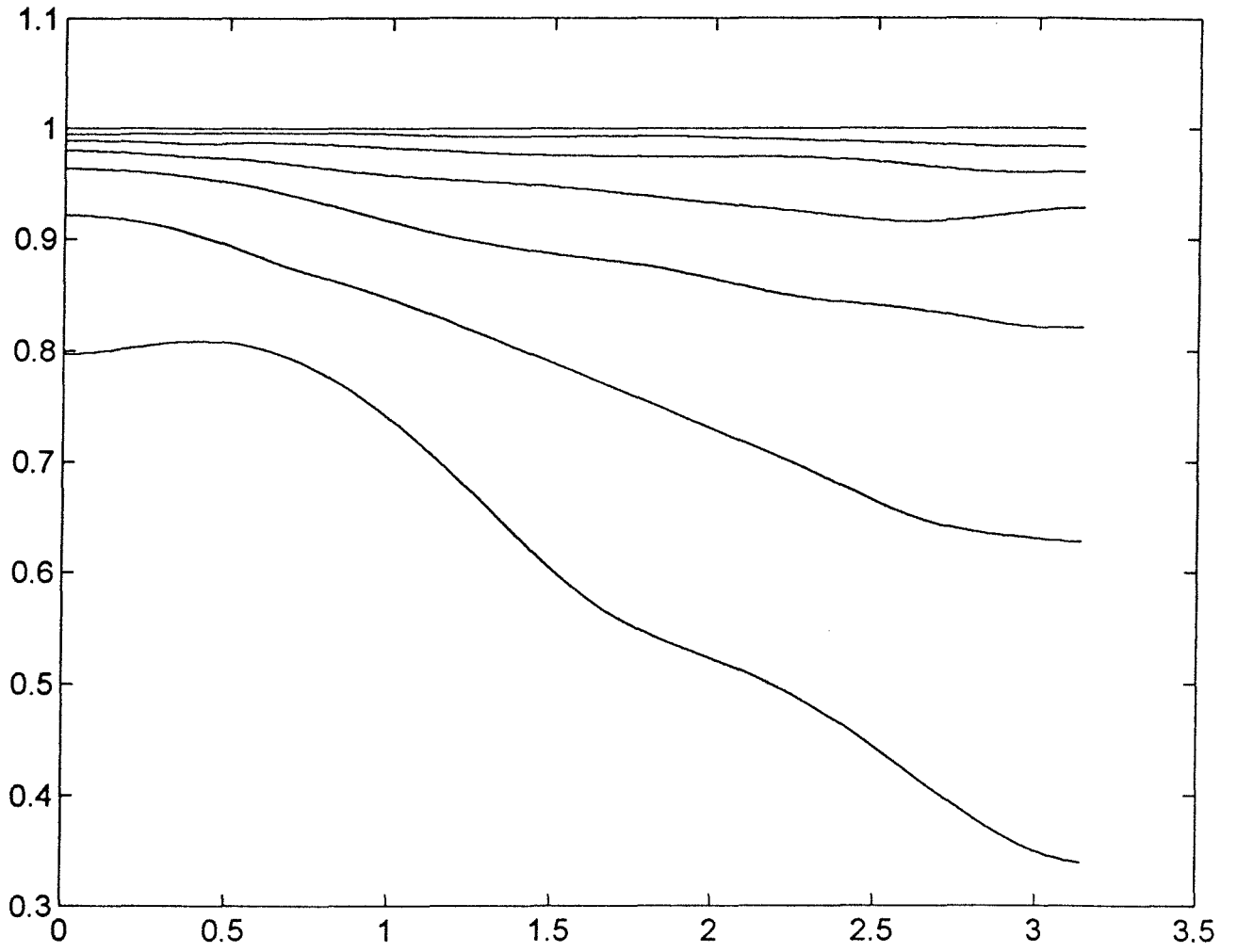


FIG 6

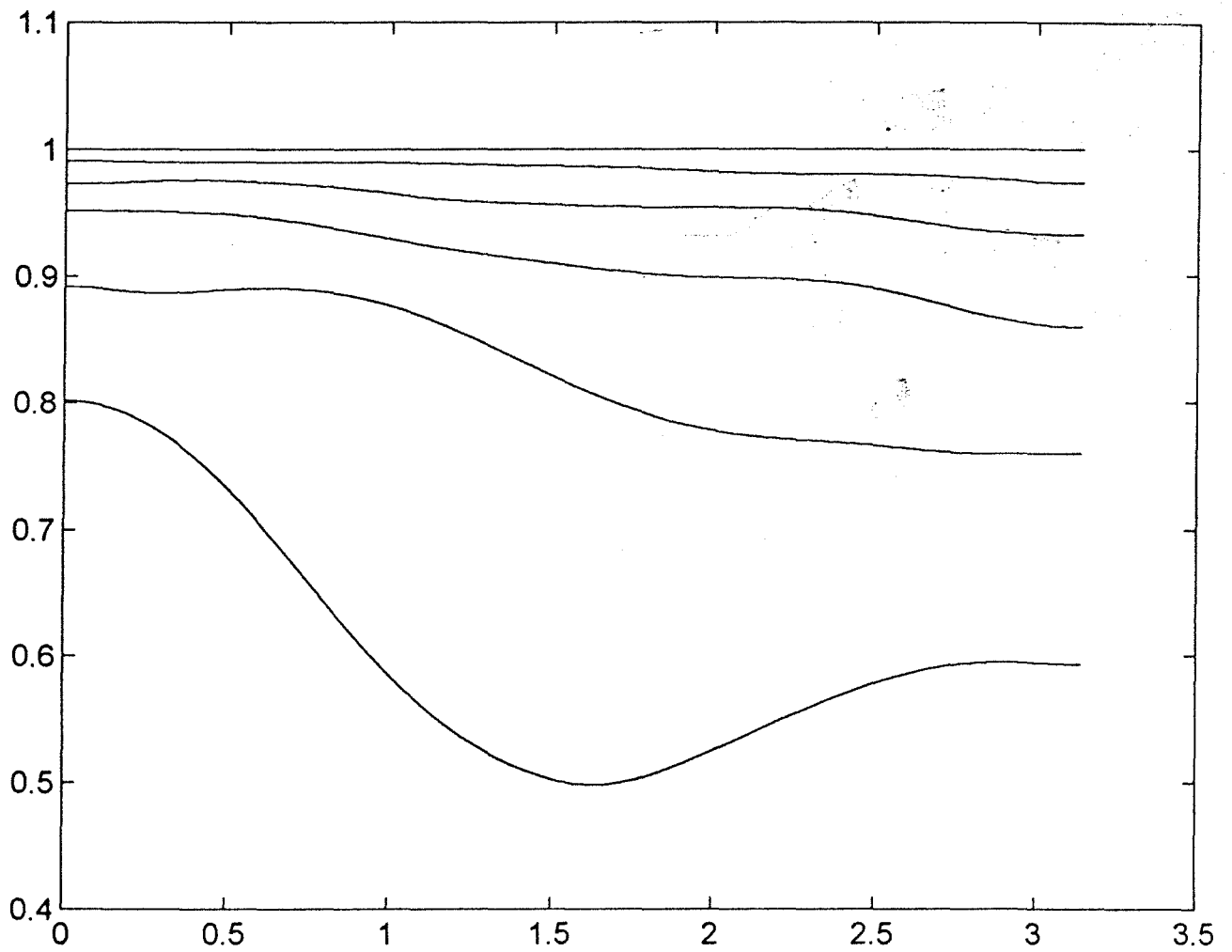


FIG 2

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