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GROWTH IN ITALY. A NOTE USING
REGIONAL DATA**

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Employment Intensity of Growth in Italy

A Note Using Regional Data

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Summary

The aim of this paper is to provide a measure of the relationship between employment and output growth in Italy and to illustrate its dynamics across a relatively extended time-span (1970-2004). Given the well-known and persisting regional differences of labour market performance and dynamics in Italy, our analytical approach favours the exploitation of spatially disaggregated information, employing regional (NUTS 2) data. The availability of industry composition of employment and value added also allows light to be shed on sector employment intensity of output growth, and the estimation of sector elasticity to GDP describes structural change. The empirical analysis supplies quantitative information about the evolution of employment elasticity during the period considered, clearly depicting the well-known period of job-rich growth (observed since the mid-1990s), after a period of job-less growth. The outcomes also show how regional levels of analysis, together with industry breakdown, may provide very useful information, especially on policy grounds and the desirability of the extension of the study to European level.

J.E.L. Classification: E.24, R.23, O.18.

Keywords: employment elasticity, growth, productivity, regions

1. Introduction, Aims and Outline of the Paper

This paper analyses employment intensity of growth in Italy using regional data for the period 1970-2004. As a large amount of available literature shows, the concept of employment intensity of (or employment elasticity to) growth has attracted much attention, due not only to the policy interest of the topic but also to the variety of possible approaches to its study, with differing theoretical implications and empirical consequences. Our starting point, however, is the simple empirical evidence that, following a period of so called job-less growth (Bean, 1994; Padalino - Vivarelli, 1997; Solow, 2000; Baici and Samek Lodovici, 2001; Garibaldi and Mauro, 2002; Sapir, 2004; Blanchard, 2005), starting from the mid-1990s a phase of job-rich growth took place at European and Italian level, arousing increasing interest also on political grounds. The main objective of this paper is to provide a measure of the relationship between employment and output growth in Italy and to illustrate its dynamics across a relatively extended time-span rich in meaningful economic and structural developments. Given the well-known and persisting regional differences of labour market performance and dynamics in Italy, our analytical approach favours the exploitation of spatially disaggregated information, focusing on regional (NUTS 2) data. Moreover, as will be discussed later, and again relying upon elasticity estimation, the availability of data on the industry composition of employment allows light to be shed on structural change dynamics. The paper is organised as follows. Section 2 is devoted to a brief review and discussion of the existing literature more directly related to the topic. Section 3 presents our empirical approach. Section 4 shows and discusses the empirical findings of the paper. Section 5 concludes.

2. Output Growth and Labour Market Dynamics: Literature and Conceptual Bases of the Study

The relationship between output growth and labour market performance may be considered among the traditional themes of economic analysis. We now (§ 2.1) briefly recall the “traditional” but variegated point of view represented by the literature originating from the “Okun’s law”, but without entering into excessive technical or analytical detail. Then (§ 2.2) we review the literature focusing on the relationship between employment and growth (employment intensity/elasticity to growth), specifying some advantages and differences of considering employment aggregates rather than unemployment rates. Lastly, we discuss the usefulness of considering the regional level of analysis also in this type of research (§ 2.3).

2.1 Okun’s law

The richest stream of the latest literature derives from the classical works by Okun (1962, 1970), in which the famous (now textbook) “law” was formulated in terms of the relationship between output growth and unemployment rate dynamics: each percentage point above full employment is associated with a fall of about three per cent in real GNP (Okun, 1962). Although this link was essentially given the status of an empirical regularity, the approach was implicitly “supply-side” oriented (Prachowny, 1993), the deviation of the unemployment rate from its natural level being assumed to induce a certain deviation of output from its long-run (or equilibrium) trend (“potential” GNP). In the subsequent literature, this direction of causality was one focus of the debate, as witnessed by the many contributions adopting output growth rates as the exogenous and unemployment rates as the endogenous variables (e.g., Dopke, 2001; Gabrish and Buscher, 2005; Perman and Tavera, 2005).

Although Okun’s law is the second pillar (together with Phillips’ curve) of the aggregate supply relationship (Prachowny, 1993), the status of “empirical regularity” attached to it to some extent masked the importance of its theoretical foundations. This stimulated interesting attempts at recovering its theoretical bases. Indeed, one important area of research moved from the fact that Okun himself (1970) stated that his (1:3) relationship hid changes in other factors and inputs that accompany employment growth and foster output growth, i.e., it induced increases in the size of the labour force, longer working time and productivity. In this context, various authors (e.g., Freeman, 2001; Sogner and Stiassny, 2002; Prachowny, 1993; Attfield and Silverstone, 1997; Gordon, 1984; Adams and Coe, 1989) incorporated capital and labour to augment estimates of Okun’s law from production functions, whereas its simplest formulation remained a particular case in which the other variables lie in their long-run equilibrium paths or change *pari passu* with the

unemployment rate (Okun, 1970, p.140). However, although the risk of the simple Okun coefficient being mis-specified is high, Perman and Tavera (2005) suggest that the simplest Okun relationship may be interpreted as “*the net effect of several macroeconomic structural parameters representative of the macroeconomic behaviour of the countries under examination and of the characteristics of the adjustment mechanism lying behind the inverse relationship between output gaps and unemployment gaps over the business cycle*” (p. 2502).

Again deriving Okun’s law from an aggregate production function, Courtney (1991) and Palley (1993) first introduced the idea of the possible asymmetry of the relationship (output expansion and contraction are accompanied by a different change in unemployment). Their arguments invoked factor substitution (hours, labour force participation and capital) during cycles, multi-factor productivity, participation rates, and changes in the relative strength of sectoral growth rates (Harris and Silverstone, 2001). Empirical evidence of these conjectures was provided in these papers and in subsequent works. Among them, Harris and Silverstone (2001) showed how the assumption of a symmetric relationship would lead to the rejection of the hypothesised existence of a long-term relationship between unemployment and output in US and New Zealand. Further theoretical grounds and empirical evidence of non-linearity were also reported, for example, by Virén (2001) and Lee (2000) with reference to OECD countries, Silvapulle *et al.* (2004) and Cuaresma (2003) for US, and Mayes and Virén (2002) and Dopke (2001) for European countries.

Other authors criticised the simplest versions of the relationship for neglecting the role of prices (e.g., Flaig and Rottman, 2000), institutional factors (e.g., Revenga and Bentotila, 1995) or exchange rate volatility (e.g., Buscher and Müller, 1999; Stirböck and Buscher, 2000).

From the empirical point of view, although a large number of papers referred to single countries, many other authors aimed at investigating the stability of Okun’s relationship across space. Examples of cross-country comparisons are those of Moosa (1997) and Padalino and Vivarelli (1997) for the G-7 countries, Freeman (2001) and Kaufman (1988) for sets of industrial countries, and Lee (2000), Baker and Schmitt (1999) and Erber (1994) for (selected) OECD countries. The papers of Perman and Tavera (2005) and Dopke (2001) are examples that focus on European countries; Gabrisch and Buscher (2005) and Izyumov and Vahaly (2002) refer to transition countries. While an extensive amount of literature is devoted to regional labour market performance and dynamics from very different points of view (for a useful and organised review, see Elhorst, 2003), only a few (and recent) papers have been devoted to sub-country analysis of Okun’s relationship; examples include Adanu (2005) in the case of Canadian provinces and Christopoulos (2004) and Apergis and Reztis (2003) for Greek regions.

A further area of interest is the stability of Okun’s relationship over time. The hypothesis of convergence of the coefficient for the European countries is, for example, tested in Perman and Tavera (2005). Weber (1995), Lee (2000), and Sogner and Stiassny (2002) are examples of papers testing the existence of structural changes in the coefficient.

2.2 Employment Intensity of Growth

Although the direct relationship between growth and employment is not as popular as Okun’s law, it has gained growing interest in recent years mainly due to the policy centrality of the issue; for example, the targets of the European Employment Strategy (EES), launched at the 2000 Lisbon Council, were set in terms of employment rates.

Its simplest formulation relies upon the familiar concept of elasticity, i.e., a responsiveness index which, in this case, describes the per cent reaction of employment to a one per cent change in output. The concept of elasticity implies *per se* a casual direction (in the framework of a demand-side approach)¹; *vice versa*, the common approach considers the labour-output relationship in a production function context, i.e., labour is one input, and productive circumstances determine the output elasticity to the factors employed. However, the employment intensity (or elasticity) of growth can also be simply used, together with other traditional labour market indicators

¹ “Employment elasticity measures the percentage changes in employment induced by changes in GDP. Hence, the elasticity of employment seeks to capture the responsiveness of the labour market to changes in macroeconomic conditions (as represented by GDP growth). [...] the notion of employment elasticity focuses only on the demand side of the relationship (with GDP acting as a representation for aggregate demand) and ignores the supply side (the output effects of labour utilisation)” (Islam and Nazara, 2000, pp.4-5).

(employment and unemployment rates), as a measure of how employment and output vary together over time. From this point of view, the relationship may be interpreted in terms of correlation, rather than causality (Kapsos, 2005). Theoretical considerations may be re-integrated *ex post* by studying the determinants of employment intensity (e.g., Kapsos, 2005; Mourre, 2004; Dopke, 2001) and examining, first of all, the role of technology, since the productivity intensity of growth is clearly the other side of the coin². But the importance of structural factors (e.g., industry composition of the economic system), labour costs, labour market institutions and their dynamics, and other macroeconomic factors must also be considered.

Thus, the estimation of the relationship may be, *ex ante*, less theoretically demanding; moreover, with respect to Okun's coefficient measurement, it has some attractive advantages. First of all, it allows us to avoid some measurement problems of the unemployment rate, particularly those due to different definitions of unemployed person and to interactions between unemployment and labour force participation. These in turn depend on benefit systems, trade unions strength, and the structure of increased labour demand (Boltho and Glyn, 1995). Second, Okun's law is estimated in gaps, so that the empirical (and problematic, if short time-span data are available) step of estimating long-run levels of output and unemployment rates can be avoided. In addition, employment (and employment intensity) may be distinguished into various sub-groups. Unemployment also allows various sub-groups to be targeted (e.g., male, female, youth, long-term unemployment), but employment aggregates offer a wider set of opportunities: beyond male/female and age class employment, permanent/temporary, part-time/full-time groups can also be considered. Most importantly, the sector composition of employment can also be used to determine industry-specific elasticity or to describe structural change, as carried out, for example, by Kapsos (2005). In that paper, the author uses sectoral employment data to highlight differences in industry elasticities (relationship between employment and value added in a given sector), but also estimates the relationship between employment in each sector and total GDP: differences in the value of these elasticities describe structural change evolutions.

Although the employment/growth relationship is involved in each study in which, investigating employment dynamics, includes GDP among the determinants, some papers focus explicitly on the employment intensity of growth. The range of approaches used is ample and varies from a very simple computation of the index to complex econometric estimation of the coefficient. We briefly review below some of the most recent and important references.

Kapsos (2005) first calculated arc elasticity and showed that the measure, as already stressed by Islam (2004) and Islam and Nazara (2004), is highly unstable. Consequently, he carried out a pooled regression of log employment on log GDP with country dummy and interaction (country dummies * GDP) variables, in order to estimate point elasticities for the single countries. As already mentioned, joint consideration of the sector elasticity and of the relationship between sector employment and total GDP is interesting, since it shows patterns of structural change and provides insights into the relationship between productivity growth and employment growth in various economic sectors. Lastly, Kapsos used the estimated coefficients to analyse possible determinants of elasticity levels. However, the author himself warns that: (i) the simple empirical specification exposes possible omitted variable problems; consequently, the empirical relationship is to be considered as an indicator of co-movement (correlation) and should not be interpreted in terms of a causality relationship; (ii) employment elasticities can display high volatility from one period to another; and (iii) more employment-intensive growth does not assure overall macroeconomic improvement (for example, in terms of poverty reduction or inequality dynamics).

Dopke (2001), after having estimated various versions of Okun's law, analyses the long-run relationship between (log) employment and (log) GDP for single countries, a using time-series approach. After having verified that both variables are integrated of order one and having tested for co-integration, the relationship is firstly estimated by adding a trend variable to the simple regression, in order to capture the exogenous influence of technical change. Then an error correction equation is estimated, which combines short-term effects on employment with long-run impacts derived from the co-integration equation (DOLS). After demonstrating (SUR estimates and

² For a comprehensive discussion of the relationship between output, employment and productivity dynamics, see Landmann (2004), who also considers the implications of these interactions for income distribution patterns.

Wald tests) that the countries considered have significantly different levels of elasticities, he investigates the determinants of employment elasticities, including the per cent share of the service sector, real labour costs, labour market flexibility and institutions, and exchange rate volatility.

Pehekonen (2000), after having criticised the static specification of the econometric models, used quarterly data for Finland for the period 1975-1996 to estimate an error correction model capable of distinguishing short- and long-term impacts of growth on employment. For the same reasons, the error correction model was also used by Mourre (2004) in order to estimate employment equations (in terms of units, full-time equivalents, hours worked) derived from a CES production function (i.e., applying a labour demand equation), under the assumption of profit-maximising behaviour by firms³. He also tested if employment determinants in the euro area as a whole (but considering country differences) in the period 1997-2001 differed from those in the period 1970-early 1990s. In order to test the overall stability of the equation, he used recursive estimates of the coefficients. In order to take into account heterogeneity across countries, a panel fixed-effects regression model for the employment equation was also tested for 21 countries. A break in the employment equation was modelled by introducing a dummy variable for the period 1997-2001. Lastly, Mourre also tried to explain the change in employment patterns by changes in the sectoral composition of the euro area employment, developments in labour market institutions, and the impact of active labour market policies. Examples of papers focusing on transition countries of central and eastern Europe are those of Saget (2000) and Gabrisch (2005).

Padalino and Vivarelli (1997) stressed how the concern about employment intensity of economic growth has increased due to the fact that *“current forms of technological change have weakened or even eliminated the positive correlation between growth and employment which so marked the Fordist Golden Age”* (p. 191). They provided a theoretical consideration of the relationship from “regulation theory” perspectives, discussing deeply how and why the relationship evolved following the crisis of the Fordist form of regulation. Empirically, the authors computed overall and manufacturing employment elasticities over the whole period (1960-1994) and for two sub-periods chosen as consistent with theoretical premises (1960-1973 and 1980-94 for the Fordist and post-Fordist periods, respectively). They used the elasticity formula to represent the long-term relationship and the correlation of employment and GDP annual growth rates for the short-run. They also ran time-series regressions of employment growth rates and GDP (or AV) growth over the whole period, testing for the existence of structural breaks. Boltho and Glyn (1995) used similar approaches for the time-span 1970-1993, but distinguished sub-periods of recessions and expansions. The evolution in employment elasticity (in manufacturing) for various developing countries over the period 1971-1998 was also studied by Kahan (2001), who used dummy variables interacted with (log) manufacturing value added. These data were used by Islam (2004) to analyse employment intensity of growth in a policy-making framework targeted at poverty reduction.

The focus on manufacturing is also one of the peculiar features of Mazumdar’s (2003) paper. He first stressed the centrality of manufacturing output growth for total economic growth in developing countries, based on the “Kaldor’s law” of economic development. However, *“if the elasticity of employment with respect to output is low, the economy can end up with an ‘enclave’ type of development in which the impact of even a respectable rate of manufacturing growth has only a limited effect on the rest of the economy”* (p.564). In particular, the author stressed how the dynamics of (producer and consumer) prices can affect nominal and real wages, and consequently employment. In some circumstances (explained by models such as implicit contracts theory, efficiency wages theory, insider-outsider models), the response to output growth may not be an increase in labour demand but an increase in wages. So employment elasticity is ultimately linked

³ *“From an economic point of view, the use of an error correction model is justified by the existence of costs of adjustments, which induce a slow response to shocks to labour demand (e.g., changes in GDP or labour costs), as pointed out by the large literature on dynamic labour demand, e.g. Nickell (1986). As explained by Hamermesh and Pfann (1996), these adjustments costs are of two kinds. First, the net costs are those of changing the number of employees in the firm, for instance the loss of efficiency due to the internal reorganisation of work. Gross costs of adjusting labour demand are those related to the flows of workers entering or leaving the firm, such as search and recruitment costs, slow adjustment of capital stock, the cost of training and job protection legislation (mandatory notice of layoffs, severance payment, cost of legal disputes, etc.)”* (Mourre, 2004, p.10-11).

to the way in which the fruits of output growth are divided between employment and wage growth; this depends on labour market institutions and, in particular, on how the interests of 'insiders' work out relative to those of 'outsiders'.

Given the aims of the present paper, we mention two works focusing on sub-national levels of analysis of employment intensity of growth. Islam and Nazara (2000), after having stressed how the topic is of crucial importance in the perspective of poverty reduction, explained how the concept of employment intensity of growth is endogenous to technical and knowledge changes and to policy regimes. These factors alter the relationship (slope and intercept) over time, so that its updating over time is crucial. The authors used different time periods for estimating arc and point employment elasticity (cross-section and time series approaches) for Indonesian provinces. They also argued that a more efficient estimate may be obtained by pooling cross-section and time-series data. The additional efficiency comes from the larger number of observations available for the estimation process and from the opportunity of introducing other important variables into the model specification. A set of regional dummy variables (also interacted with log-output) is one possibility of including structural differences in the model: this is a standard panel estimate, with individual effects if (intercept) dummy variables are included for the whole set of regions. This approach (pooled estimates with country dummy variables) is thus similar to that of Kapsos (2005). Recently, Perugini and Signorelli (2006) analysed co-movements of employment and output for the European (NUTS 2) regions, calculating simple arc elasticity and correlation indexes.

Kangasharju and Pehekonen (2001) used the Finnish travel-to-work area (TTWA) to estimate employment elasticity by means of a dynamic panel approach. They also compared the size and significance of the coefficients estimated for sub-groups of the functional regions, identified *ex-ante* on the basis of some structural features.

Lastly, again from a review of the literature, we mention some important points involving the caution required in considering employment elasticity. First of all: what is more desirable, employment or productivity intensive growth? In order to produce economic development objectives (such as poverty reduction, reduction of social exclusion, etc.) we need both of them. However, overly job-rich growth dynamics may be not desirable, since they may translate into productivity losses and persistence of low growth rates. From this point of view, Islam (2004) stressed the desirability of a positive but lower than one elasticity⁴ and similar considerations were put forward by Kahn (2001). To some extent, these considerations also imply the fact that, while the employment intensity of growth is a purely quantitative exercise, qualitative aspects should also be taken into account: *"It is important to keep in mind that, from an economist's point of view, employment and jobs are inputs, not outputs, and more jobs are not necessarily a good thing if they fail to increase productivity or to reduce involuntary unemployment. Indeed, the same EU documents that call for policies to promote employment growth also stress that 'good' jobs are what is needed, where 'good' jobs in the policy makers' jargon are likely to be synonymous with high wages and high productivity jobs"* (Garibaldi and Mauro, 2002, p.71).

Other (technical) cautions regard to correct data usage and interpretation. First of all, employment statistics in terms of units may be highly misleading, since they do not take into account the general trend towards a decrease in the working time per employee (Maddison, 1991). Lack of consideration of this tendency may lead to over-evaluation of employment elasticities in most recent times (Padalino and Vivarelli, 1997). In addition, as clearly stated by Saget (2000) great attention should be paid to the impact of the unofficial economy on GDP and employment data, since it may alter their relationship.

2.3 Desirability of sub-national levels of analysis

The literature review revealed the relative scarcity of studies focusing on sub-national levels of analysis of the relationship between output growth and labour market dynamics. We briefly

⁴ "[...] employment elasticity reflects the inverse of labour productivity. While an elasticity higher than unity implies decline in productivity, a lower than unity elasticity means that employment expansion is taking place along with an increase in productivity. A rise in productivity would lead to a reduction in employment elasticity. Therefore, raising employment elasticity in individual activities cannot be the objective as that would mean a further lowering of productivity in economies that may already be characterized by widespread low-productivity employment" (p.5).

discuss here the desirability of complementing country level analyses with more spatially disaggregated approaches.

The basic reason derives from the strong social and economic diversification observed within many countries, especially at European level, where Italy is one of the most classical and outstanding cases. This obvious evidence is clearly supported by the very extensive theoretical and empirical literature on regional economic and social disparities and their dynamics. As mentioned in the previous section, employment elasticity may depend on a set of macroeconomic features (e.g., inflation, labour market regulation, exchange rate volatility, etc.), but other structural determinants may differ regionally. So employment elasticity may vary considerably between regions, due to the existing strong diversification of: (i) development levels and dynamics; (ii) labour market performance and peculiar institutional settings (in the sense of Solow, 1990); (iii) structural characteristics affecting (i) and (ii) and their interactions.

The importance of this expected diversification of the relationship is clearcut on policy-making grounds. Promoting faster economic growth is the basic target at European level, where high unemployment (and low employment, within the framework of the Lisbon strategy) is also a major concern and one of the main sources of socioeconomic disparities (Bracalente and Perugini, 2006). Consequently, understanding the extent to which output growth translates into employment (or, specularly, into productivity growth) in various regions is crucial to an understanding of whether the (possible) economic convergence process also reverberates on labour market dynamics. This may help to distinguish between regional labour market weaknesses, to be mainly addressed by development policies (i.e., aimed at promoting economic growth), and those to be targeted also employing labour market policies (in particular, active LMP, capable of improving the functioning of labour markets).

3. Empirical scope and approach of the paper

In this paper, we provide estimates of employment elasticity to growth for the Italian economy using regional data (20 NUTS 2 Italian administrative regions) data. The analysis applied the data of Crenos⁵, which cover information about total GDP and employment (units) and industry breakdown of Value Added and employment over the period 1970-2004. As in Dopke (2001), sectoral data are used both to estimate the sector-specific employment elasticity and, in order to provide evidence of structural change, to estimate sector employment elasticity to GDP growth. From the empirical point of view, based on Kapsos (2005) and Islam and Nazara (2000), we use a static panel approach to estimate the following basic double-log linear equation:

$$\ln L_{it} = \alpha_i + \beta_1 \ln Y_{it} + e_{it} \quad [1]$$

where:

- L and Y are total employment units and real GDP (gross domestic product at market prices, constant prices 1995), respectively, in region *i* and at time *t*;
- coefficient β is the estimated elasticity (assumed to be common for all the regions in this first stage);
- $\alpha_i = \alpha_{it} = \alpha + \mu_i$ [2]
is the time-invariant intercept, made up of a common factor (α) and regional individual effects (μ_i), introduced in order to take into account the effects of heterogeneity between regions;
- *e* is the error term.

We therefore prefer here to focus on the simplest form of point elasticity, not distinguishing between short- and long-run effects, which may be obtained by adopting dynamic specifications. The same relationship was also estimated by means of the following specifications:

$$\ln L_{it,j} = \alpha_i + \beta_1 \ln Y_{it} + e_{it} \quad [3]$$

⁵ Data and information notes are available at: www.crenos.it.

and

$$\ln L_{it,j} = \alpha_i + \beta_1 \ln VA_{it,j} + e_{it} \quad [4]$$

where J indicates the sector for which Value Added (VA) (constant prices 1995) and employment are considered. For the aims of this paper, we set $J=5$: (1) agriculture, mining and fishing (A); (2) industry in the strict sense (INSS); (3) building and construction sector (C); (4) market services (MS); (5) non-market services (NMS).

In order to take into account (and to provide evidence of) possible heterogeneities also in the slope of the relationship (i.e., sub-national differences in employment elasticities), equations 1, 3 and 4 were also estimated in the following forms:

$$\ln L_{it} = \alpha_i + \sum_k \beta_k Y_{it} * D_k + e_{it} \quad [5]$$

$$\ln L_{it,j} = \alpha_i + \sum_k \beta_k Y_{it} * D_k + e_{it} \quad [6]$$

$$\ln L_{it,j} = \alpha_i + \sum_k \beta_k VA_{it,j} * D_k + e_{it} \quad [7]$$

where $k=4$ are four usually adopted Italian geographical divisions (North-West, North-East, Centre, South and Islands) and D_k are the corresponding dummy variables. Of course, in all the specifications, the individual regional effects were considered by implementing panel fixed effects models (the choice of a fixed effects, rather than a random effects, specification was driven by the outcomes of the usual Hausman test).

We have already discussed (see the previous section) how, as suggested by Islam and Nazara (2000), the concept of employment intensity of growth is, by its own nature, endogenous to technical and knowledge changes and to policy regimes. As an obvious consequence, these factors (and many others, more or less closely connected to them) alter the relationship over time, so that its updating is crucial. We attribute crucial importance to this point in this paper, in order to highlight how the level of the employment intensity of growth changed over the period considered. Thus, the equations described above were estimated for the whole period 1970-2004, and for a "rolling" window of sub-periods covering n years. This rolling estimate technique, used for example by Perman and Tavera (2005) and Schnabel (2002), provides the dynamics of the $(t-n)$ estimated coefficients of the relationship. In this case, we set the window at $n=11$, which makes available 24 estimated elasticities from the 1970-1980 (first) to the 1994-2004 (last) sub-period. The choice of n is, to some extent, arbitrary: our choice was made by maximising the informative potential of the dynamics of the estimates, compatible with: (i) a time-span long enough to ensure reliability of econometric estimates, and (ii) the capacity of the sub-periods to illustrate meaningful changes. From this point of view, our $n=11$ satisfactorily represents, for example, the transition phase to the post-Fordism of the 1970s (in the perspective adopted, for example, by Padalino and Vivarelli, 1997), and many of the evolutions in GDP and employment dynamics observed over the period considered (e.g., the recent positive trend in employment from 1994 onwards, the decrease in the employment growth rate of the 1980s) (see diagrams 1 and 2 in the following section).

As regards the data used in this paper, with reference to the problems listed in the last sentence of section 2.2, elasticity may have been over-evaluated due to the use of employment units. However, as regards the probable effects of the hidden economy, especially in view of its strong role in southern Italian regions, it should be noted that the data used here were produced by Crenos on the basis of ISTAT estimates within the framework of the National Accounts. That is, the economic and employment aggregates are estimated according to the European System of Accounts ESA 95, which imposes computing also not directly observed components. In particular, ESA 95 classifies economic activities included within the boundaries of production (of the national accounts system) in regular and non-regular activities. The latter, consistent with definitions at

international level, are distinguished into illegal, informal, and underground activities⁶. Illegal activities are not included in the European Countries accounts, whereas the informal sector and the hidden economy are taken into account in the economic aggregates (e.g., GDP and Value Added) as well as in the others, including labour inputs. This is not the place to enter into details of estimation procedures, but reference may usefully be made to the many available methodological notes (e.g., see Istat, 2004 and 2005).

4. Empirical analysis

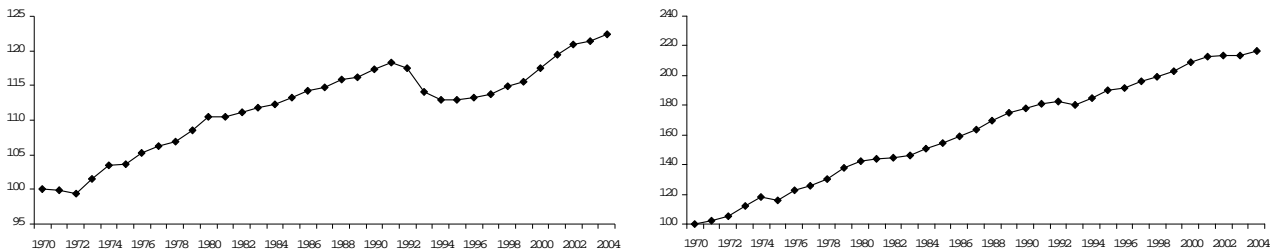
We now illustrate the outcomes of our empirical analysis. Section 4.1 provides some introductory information about overall Italian GDP and employment dynamics in the period considered and regional disparity levels and dynamics. Section 4.2 gives the outcomes of the estimation of employment elasticity to GDP growth and sector employment elasticities. Section 4.3 describes structural change patterns by means of sector employment elasticity to total GDP. The econometric approach adopted produced a large amount of estimates, which are impossible to report here. We only illustrate in the appendix the values of the estimated elasticity coefficients (tables A1 to A11).

⁶ Classified as “illegal” is the production of goods and services, the selling, distribution and possession of which is prohibited by law. “Informal” activities are those carried out at low levels of organisation, with scarce or no division between factors of production and labour relations based on kinship or personal ties. “Underground” productive activities are not directly observable legal activities, due both to problems related to statistical measurement and to the fact that firms deliberately hide themselves (partly or totally) to welfare, fiscal and other institutions.

4.1. Introduction on overall trends of GDP and employment and regional disparities

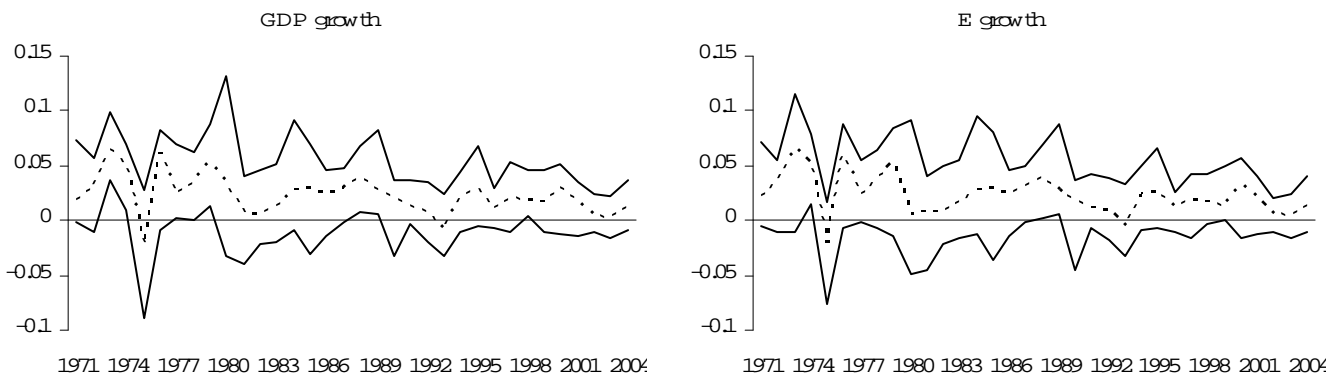
The first two diagrams show the dynamics of real GDP and employment in Italy from 1970 to 2004 and illustrate the various phases of recent developments in the Italian economy. The shape of the two series are clearly quite different, and this means that the employment intensity of growth changed markedly during the period considered, the most striking evolutions happening from 1990 onwards.

Diagram 1. Gross Domestic Product (at market prices, constant prices 1995) and employment in Italy, 1970-2004 (1970=100)



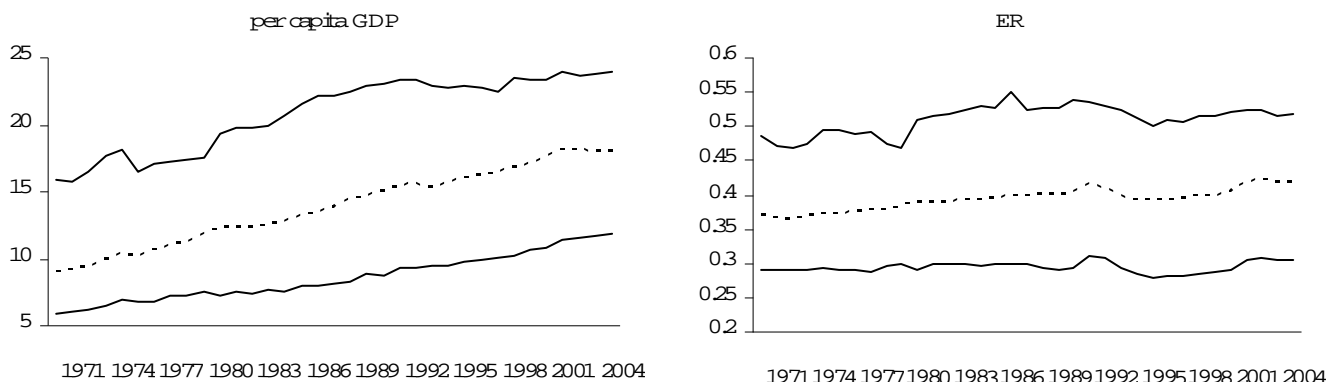
Italy is well-known to be afflicted by huge regional economic disparities, as shown in diagrams 2, 3 and 4. The first reveals differences in output and employment annual growth rates are represented for Italy (dotted line) and for the minimum and maximum levels reached by Italian regions in each year. Although the shapes of the lines look relatively similar, the diversity in levels is remarkable, even in the most recent years.

Diagram 2. Annual GDP and Employment growth rates: Italy, regional minimum and maximum



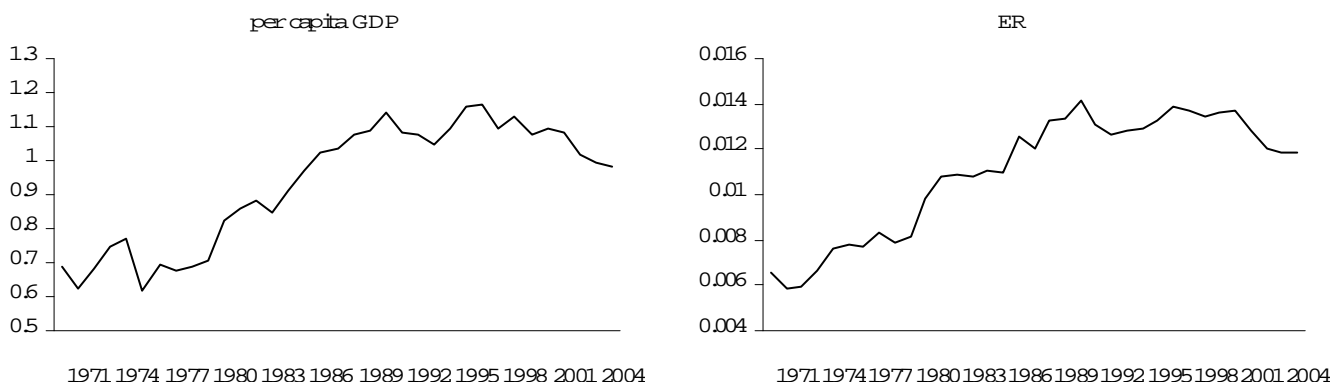
In diagram 3, the same approach is used to represent the dynamics of Italy's per capita GDP and employment rate (ER, calculated as total labour units out of total population), posed between the regional maximum and minimum for each year. The differences are again very important and persistent.

Diagram 3. Per capita GDP and employment rate (out of total population): Italy, regional minimum and maximum



In diagram 4, the trend of the coefficient of variation illustrates how regional disparities in Italy, both in terms of per capita GDP and employment rate, have been substantially growing until the late 1980s, when stabilisation and a subsequent sigma convergence pattern took place.

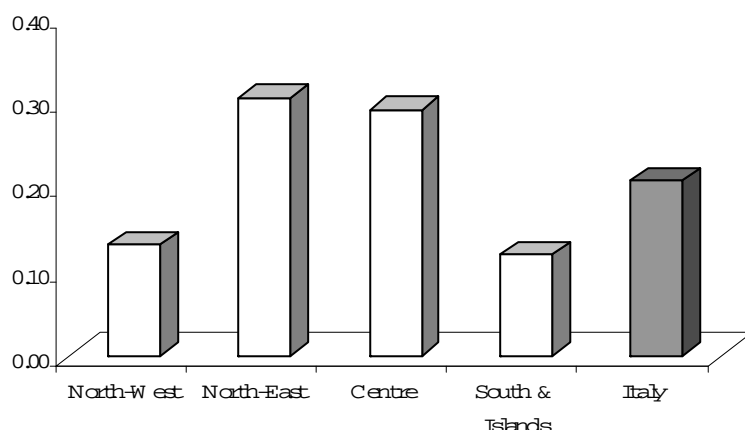
Diagram 4. Per capita GDP and employment rate coefficient of variation



4.2. Employment intensity of GDP growth and sector employment elasticities

Diagram 5 shows the employment elasticity to GDP growth over the whole period (1970-2004), estimated using equations 1 and 5. Over the whole period, for every 1% increase in output growth, employment grew in Italy by approximately 0.2%. However, the employment intensity of growth changes significantly if the coefficient is estimated separately for the four geographical divisions, and ranges from approximately 0.3% in the North-East and Centre and 0.12% in the other divisions.

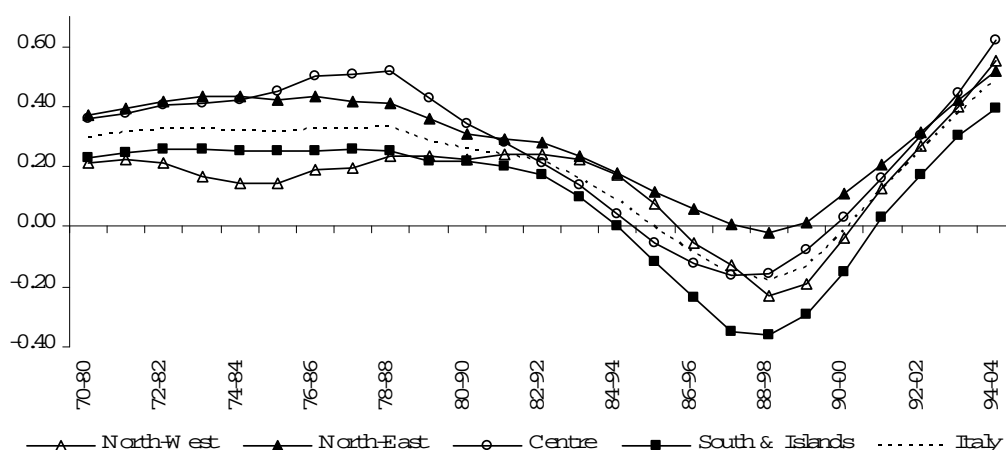
Diagram 5. Employment intensity of growth (1970-2004)



As already emphasised, the many factors affecting employment elasticity grant scarce informative power to a measure estimated for such a long time-span. In order to capture the dynamics of the relationship, Diagram 6 shows the evolution of the coefficients estimated for sub-periods of time (11 years) using the rolling estimates technique described previously, which obviously contributes towards smoothing the lines. Data are reported in table A1 of the appendix.

First of all, it is interesting to stress how the value estimated for the whole period is the result of a very unstable pattern observed over shorter runs. A relatively (but geographically diversified) stable pattern which lasted approximately until the end of the 1980s was replaced by a steep fall, corresponding to the employment drop of the first half of the 1990s and its slow growth rates in the following years. This led to negative employment elasticity in the periods included in this time-span, with a minimum level from the late 1980s to the late 1990s. Then relatively strong employment growth, accompanied by weak output dynamics, led to a remarkable increase in employment elasticity, giving rise to the so-called “job-rich growth” of the last years which brought the employment effects of growth to the highest values reached in the period considered. In the last sub-period (1994-2004), every 1% of GDP growth was accompanied by 0.5% of average employment growth, ranging from 0.4% in the South and Islands to approximately 0.55% in the Northern regions and 0.6% in the Central ones.

Diagram 6. Dynamics of employment intensity of GDP growth in Italy and geographical divisions



The time patterns of the employment intensity of growth in the four geographical divisions seem quite similar, as also witnessed by the correlation levels between the corresponding coefficients (table 1).

Table 1. Correlation between dynamics of employment intensity of growth in Italy and geographical divisions

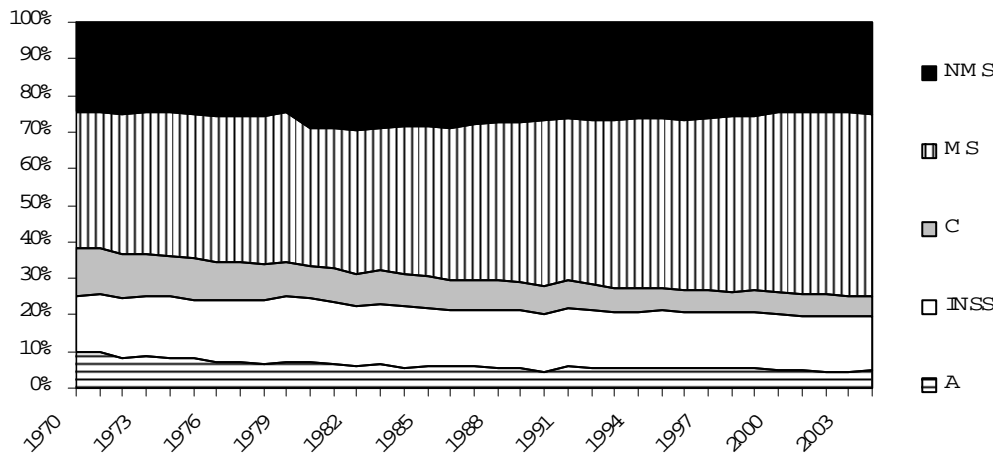
	North-West	North-East	Centre	South & Islands	Italy
North-West	-				
North-East	0.841	-			
Centre	0.817	0.982	-		
South & Islands	0.901	0.978	0.960	-	
Italy	0.902	0.989	0.975	0.995	-

* all correlations are significant at 99%

Diagram 6 also highlights the remarkable spatial differences in the levels of employment responsiveness to growth throughout the whole time-span. The South and Islands division remains steady at the lowest level, accompanied, for only limited periods, by the North-West. The North-East steady remains above the Italian average, whereas the central regions fall below the average only for the decades going from the beginning of 1980s to late 1990s. It is also interesting to note how the differences in the estimated coefficients first expanded, then shrank, for the periods covering the 1980s, and then expanded again and shrank again in the two following phases. In the rest of this section, we examine the possible effects of the different industry mix and sector elasticity on overall employment intensity of growth: diagram A1 (in the appendix) illustrates the employment intensity of value added growth in the five macro-sectors adopted here.

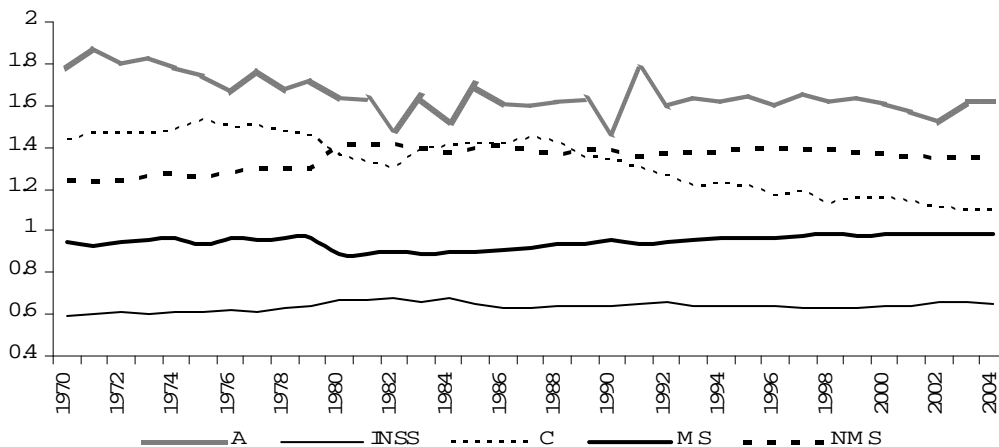
First of all, the diagrams present a very complex picture - to some extent unexpected, considering the very clear setting obtained for the aggregate level. The sector employment elasticity levels of the geographical divisions are really very changeable in their relative positions. This also happens in the South and Island for which, observing diagram 6, one would have expected a steady below-average level of elasticity in all sectors, or for most of them. However, this is not the case. Employment elasticity for the South and Islands is above the whole Italian level, in both agriculture and industry in the strict sense, in all the sub-periods considered; in the construction sector in the latest periods; in market services for the initial periods, and in non-market services for the intermediate ones. Thus, low employment elasticity to GDP growth for Southern Italy is the result of by a complex mix of movements of sector elasticities, together with the impact of the industry mix and its evolution. In order to appreciate these complex interactions, diagram 7 shows industry composition on real value added and diagram 8 the share of the various sectors, standardised on Italian levels (i.e., lines above 1 mean that the share of that sector for the South and Islands is above the Italian share, and *vice versa*).

Diagram 7. Industry mix in South and Islands



Apart from agriculture - the importance of which is high compared with the Italian average but low with respect to the other sectors - the share of industry is well below average (steady at 60% of the Italian share), so that the impact of relatively high elasticity in this sector is smoothed out. In the construction sector, when employment intensity goes above average, its importance decreases with respect to total VA and also with respect to its importance in Italy. Conversely, the large share of market services (only slightly – and steadily - below the Italian level) expands when employment elasticity drops, and this is probably one of the most important factors causing the very strong fall in elasticity observed at GDP level. Lastly, the importance of non-market services (around 25%) is, as well-known, above the Italian one. The alternation of the corresponding elasticity probably helped to slow down an even steeper fall in GDP elasticity in the central periods, and to accentuate the negative role played in the latest time-spans.

Diagram 8. Value added shares of various sectors in South and Islands standardised on the Italian shares

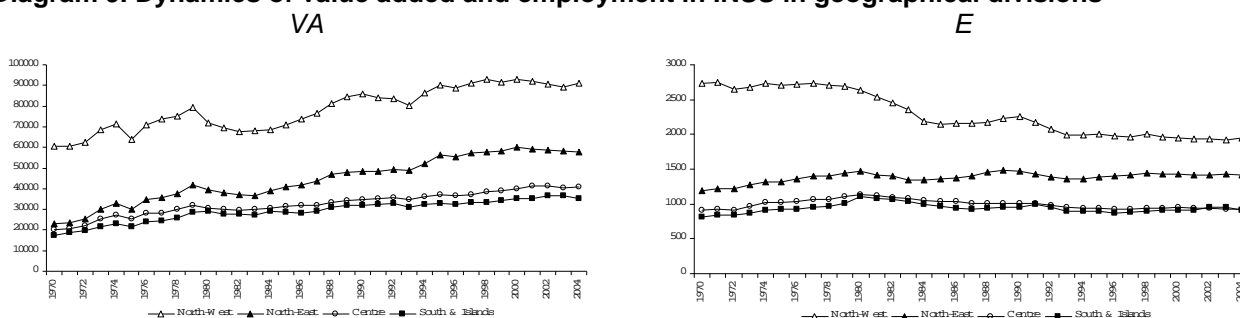


More interesting information arises from the single diagrams of sector elasticity, limited to the most influential industries, i.e., industry in the strict sense and market services. Although non-market services (NMS) are an important component of total VA and employment, especially in

some contexts, the corresponding outcomes for elasticity are only discussed marginally here since the approach used by ISTAT to provide the VA estimate implies a very poor meaning of the index⁷.

As regards industry in the strict sense, one remarkable feature concerns the opposite dynamics of elasticity in the North-East and North-West, as also revealed by their high negative correlation coefficient (-0.64). The North-West regions show a steady negative elasticity for all periods before the beginning of the 1990s; later, a strong increase takes place, followed by a new reduction in the periods covering the 1990s. Conversely, in the North-East, elasticity falls below 0 only for two periods (1987-1997 and 1988-1998) and its drop and new increase observed since the early 1980s are specular to what happened in the North-West. As regards the regions of central Italy, the decline in the INSS sector employment elasticity is inverted only in the periods covering the 1990s, when it also became positive again. The dynamics of (real) value added in INSS (diagram 9) are useful in understanding what happened in the various divisions. Apart from very short periods (mid 1970s, early 1980s, early 1990s), the output trend is steadily positive in all divisions. We have also seen how periods of descending employment elasticity (i.e., productivity growth) occurred in all the territorial contexts considered, but at different times. This clearly illustrates how the restructuring of the sector took place at different times, the (large firms/heavy industry) North-West facing this process already in the 1970s and 1980s, as a response to the crisis and the overcoming of Fordism. Conversely, in other contexts (North-East and Centre), this phase happened later (mid-1980s, mid-1990s). However, while in North-West the adjustment process was largely translated into employment losses, in the other divisions labour units only underwent relatively small declines (in the face of a growing VA).

Diagram 9. Dynamics of value added and employment in INSS in geographical divisions

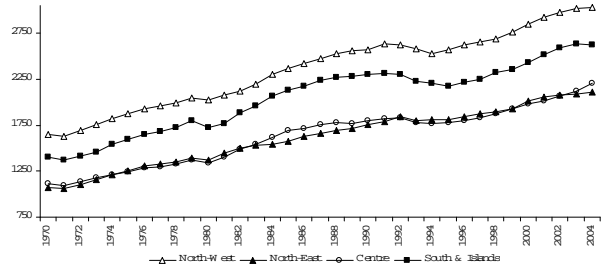
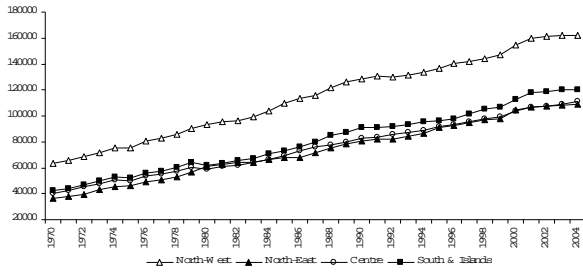


If we focus on elasticity dynamics in market services (fourth box of diagram A1), we note how the patterns of the lines strongly resemble those of aggregate elasticity (diagram 6) and conclude that the latter was strongly influenced by what happened in MS. This was also expected due to the relative importance of MS on total VA (close to 50% in all divisions at the end of the period). Consistent with expectations, the elasticity levels are far above those of other sectors, and their dynamics suggest a sort of dualism between North-West and North-East on one hand and Centre and South and Islands on the other. The first ones show very close levels and strong correlation of the elasticity coefficients ($\rho=0.87$) and their changes are more restrained and slightly lagged compared with the Centre and South & Islands. These two divisions follow equally similar patterns ($\rho = 0.97$) but with more pronounced fluctuations.

Diagram 10. Dynamics of value added and employment in market services in the geographical divisions

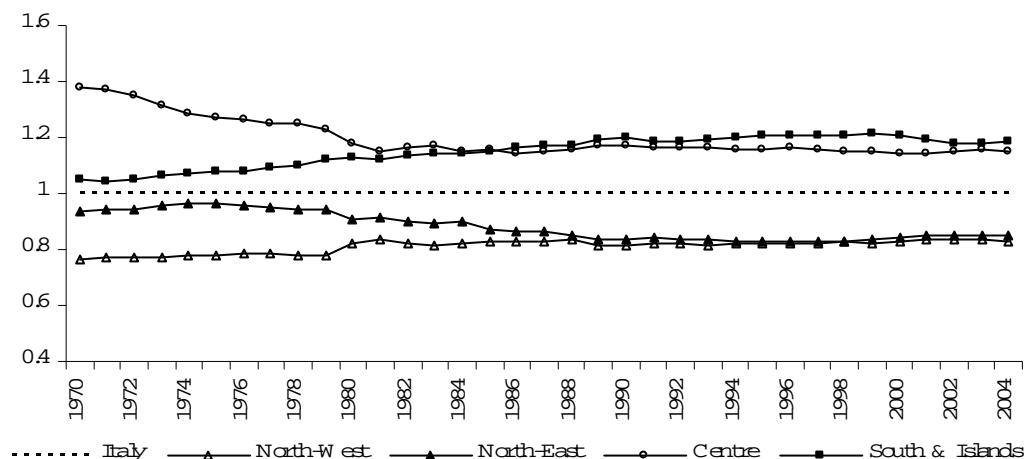
VA E

⁷ In general, the production of non-tradable goods and services is evaluated as the sum of production costs. Individual non-market services Value Added at constant prices is estimated by applying to the aggregate for a basic year the trend of the physical output (e.g., number of students in schools) in the other years. Similarly, for collective non-market services (e.g., defence), VA is estimated using the trend of labour inputs. For further details, see Eurostat (1996).



Lastly, as regards non-market services, we have already mentioned the problems of the measure of elasticity revealed by the data. However, the method of estimating labour units and value added being the same all across Italy, two geographical divisions, remarkably, have been moving away from the average since the early 1980s. The North-East accentuated its continuous decline during the 1980s and thereafter inverted the trend. Conversely, in the South and Islands, employment elasticity in this sector increased strongly in the early 1980s and, although declining, remained above average until the end of the 1990s. This is consistent with the regional specificity of the importance of non-market services (in terms of employment) in Italy, which is also clear in diagram 11.

Diagram 11. Share of employment in non-market services in the geographical divisions (Italy=1)



4.3 Sector employment elasticity to GDP growth and structural change

According to the approach adopted by Kapsos (2005), the empirical specification of equations 3 and 6 describes the structural change occurring in a given economic system in terms of industry mix change. The value of one sector employment elasticity (relative to total or other sector elasticities) to total GDP growth is indeed a very simple indicator of whether the employment importance of this sector is increasing or declining. If sector elasticities to GDP growth were in fact the same, this would mean that output growth uniformly affects employment in all sectors, thus leaving their relative composition unchanged. However, if, for example, the coefficient for market services is double that for Industry, then the former is gaining over the latter. Obviously, a value above zero means that economic growth is increasing employment in the sector and *vice versa*. Moreover, the level of this elasticity also includes “cross”-elasticity effects, i.e., the co-movement of employment in a given sector and VA growth in others (in this case, taken as a single aggregate). For example, it may happen that growth in industry generates new jobs in the third sector, by attracting new services or simply as a consequence of the outsourcing of tertiary functions by firms.

Representing these data effectively is quite difficult, due to the large amount of information available and also to the marked variety of the results, which hinder clear graphical representation. Diagram 12 shows the dynamics of the sector elasticities to total GDP for Italy; the corresponding diagrams for the geographical divisions are shown in diagram A2 in the appendix.

Diagram 12. Dynamics of sector employment elasticity to total GDP growth in Italy

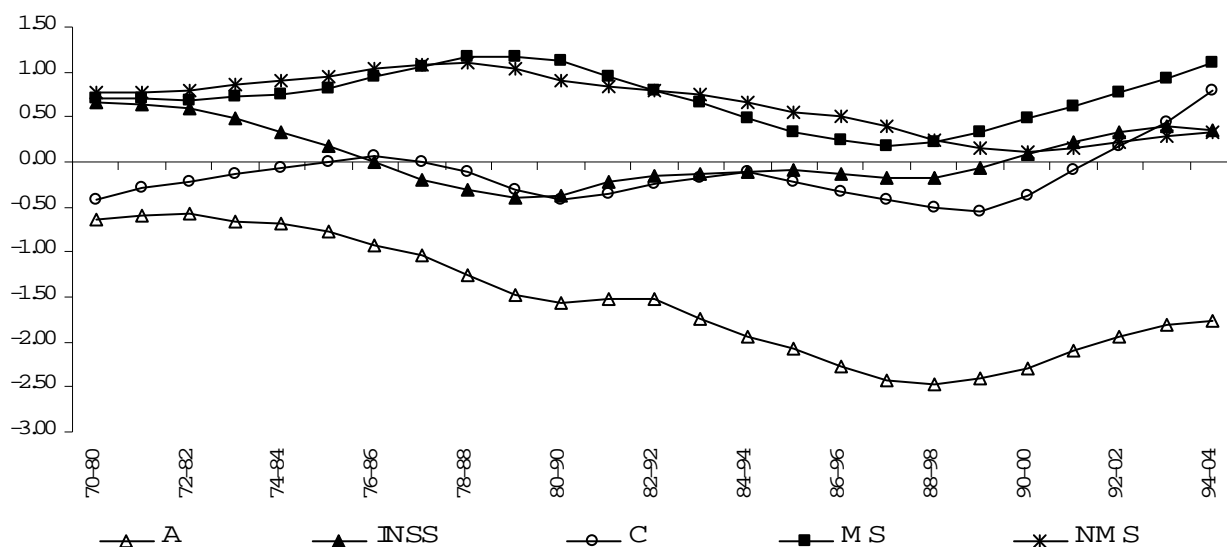
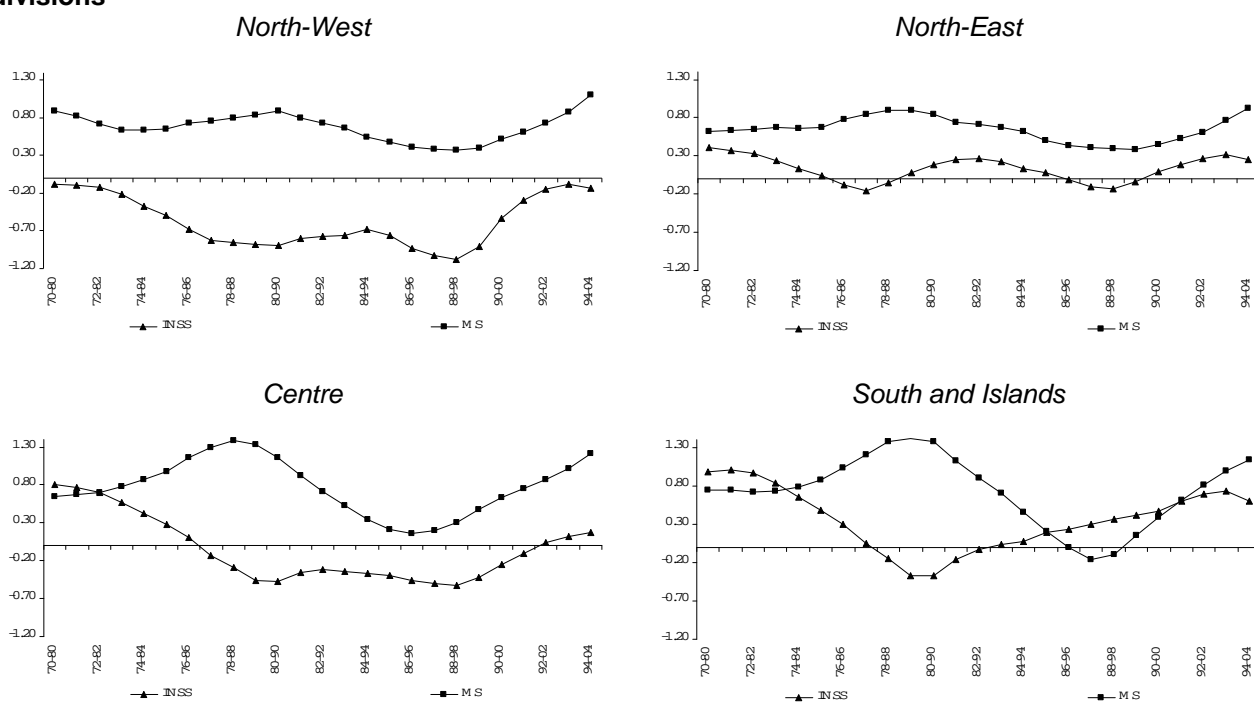


Diagram 12 clearly shows how elasticities in the construction and building sector and, especially, agriculture have steadily fallen below zero. While for the former the trend fluctuated and rose above zero (and the other sectors) in the last periods considered (those covering the early years of the new century), the negative trend for agriculture was inverted only in the 1990s and remained remarkably far from zero. Joint consideration of the two most important sectors (INSS and MS) reveals that a reallocation in favour of market services took place throughout the period considered, but was stronger until the end of the 1990s. Then, the distance started to fall and the gap (always positive for MS) remained unchanged for the following periods.

It is again very interesting to consider the same information for the Italian geographical divisions. For the sake of brevity, we provide here comments only on the dynamics of INSS and MS (diagram 13). The graph is very informative and clearly depicts what happened in Italy during the period in varying regional contexts. As regards the northern divisions, the trends of MS employment to GDP are very similar, whereas the situation in INSS differs markedly and does represent the diversity of the industrial sector in the two areas. The North-West, as already noted, underwent a continuous decline in employment in INSS in the period considered, as confirmed by the negative sign of its elasticity to GDP. However, this measure had been substantially declining until the early 1990s, approaching zero in the latest periods. Instead, in the North-East, INSS elasticity fell below zero only for very limited periods, and the measure, starting from the 1980s, maintained the same gap with respect to MS elasticity. This illustrates how sector adjustment was very strong in the “Fordist” North-West and led to a marked and steady reduction of industry, while the North-East industrial model evolved more smoothly and was able to preserve its absolute (and partly its relative) importance.

Diagram 13. Dynamics of INSS and MS employment elasticity to total GDP growth in geographical divisions



Very different considerations may be made for to Centre and South and Islands, for which fluctuations in elasticity for INSS are more pronounced. MS elasticity also initially decreased in both areas, falling below zero before the beginning of the 1990s. However, this situation only persisted for a long time in the Centre, whereas in the South and Islands INSS employment elasticity started increasing and first exceeded zero (in the period 1983-1993) and then Market Service employment elasticity to GDP. This meant that, surprisingly, in the periods from the mid-1980s to the end of the 1990s, the structural adjustment associated with output growth translated into an increase in the relative importance of industry in the strict sense with respect to market services (in terms of employment).

5. Discussion, implications and final remarks

The aim of this paper was to supply a measure of the relationship between employment and output growth in Italy and to analyse its dynamics across a relatively extended time-span and rich in meaningful economic and structural developments. After having reviewed the most important literature about the relationship between output growth and labour market performance indicators and aggregates, we present an empirical analysis focused on Italy for the period 1970-2004. Although it employed econometric tools (panel data analysis), the empirical analysis is strictly descriptive, in the sense that it only provides a description of the levels and dynamics of employment intensity of growth in various forms. One innovative aspect of the paper lies in the use of regional (NUTS 2) data, in order to take into account the great variety of labour market performance and functioning existing in Italy. The empirical analysis confirms the desirability of this level of analysis from various points of view. Another distinctive feature is the focus on the evolution of employment elasticity over the periods considered, by means of estimates organised in “rolling” sub-periods of 11 years. This choice, motivated *ex-ante* by the many evolving factors affecting employment responsiveness to growth, proved very useful, in view of the very strong fluctuations of the estimated index over the period considered. As regards the most general measure of elasticity, although remarkable regional differences exist in levels, its fluctuating trend is substantially uniform: a relatively stable pattern, which lasted approximately until the end of the 1980s, was replaced by a steep fall, corresponding to the employment drop of the first half of the 1990s and its low growth rates over the following years. This led to negative employment elasticity in the periods within this time-span, a minimum level being reached from the end of the 1980s to

end of the 1990s. Then relatively strong employment growth, accompanied by weak output dynamics, led to a remarkable increase in employment elasticity, giving rise to the so-called “job-rich growth” of the last years, which brought the employment effects of growth to the highest values reached in the period considered. This relative “uniformity” of the dynamics of elasticity for the geographical divisions may mean that, at GDP level, movements of employment elasticity in time do not depend on spatially specific factors, but are probably influenced by complex and interacting aggregate dynamics.

Study of the determinants of employment elasticity was clearly beyond the scope of this mainly illustrative paper. As discussed in the literature review, the range of possible factors affecting the size and dynamics of the coefficient is very ample, also in view of the fact that productivity intensity of growth is the other side of the coin and, consequently, the determinants of the “Kaldor-Verdoorn law” are involved. The possible impact of structural features (industry mix) was discussed in this paper; here we only mention some other possibly important factors that may have affected elasticity movements. Among other causes, the elasticity fall starting from the early 1990s may be tentatively linked to the remarkable macroeconomic effects produced by some crucial policy choices (deriving, first of all, from the accession to the Maastricht treaty). Examples are the remarkable efforts to reduce inflation (also connected with exchange rate dynamics) which, as emphasised in the existing literature, may reduce employment elasticity, since the downward flexibility of wages is hampered, or the restrictive fiscal policies that probably affected firms’ behaviour negatively with respect to labour demand. However, it is apparent that, although output continued to grow, firms did not flank this with job creation. This means that, in these years much gain on the productivity side occurred; its distribution (wages vs profits, also depending on the competition level of the corresponding goods and services markets) is a crucial point to be discussed in future research efforts.

In addition, one cannot rule out the possibility that the increase in the late 1990s was influenced by other institutional factors, especially those linked to various labour market reforms, which greatly favoured more flexible employment of labour and probably stronger labour demand responsiveness to output changes. Thus, decrease of labour costs connected to the new institutional setting (e.g., firing costs), may have encouraged firms to hire workers rather than investing in capital equipment, favouring employment intensity at the expenses of productivity growth. In addition, it should also be recalled that our measure of employment refers to units (not to full-time equivalents), so that, beyond the general negative trend of working time, if policy innovations favoured certain contracts (as is the case of part-time work), this may also have positively affected employment intensity of growth (in this case not necessarily at the expenses of workers). Instead, only a limited role should be attributed to changes in the size of the hidden economy (i.e., the emergence of “black” and “grey” work) since, as already explained, the nature of the data used suggests that hidden activities are already included in the aggregates.

As regards the differences in the geographical divisions of Italy, study of their determinants is of major interest for future research. However, the evidence produced here does provide the information that the objective of promoting economic growth in Italy has different employment (and, conversely, productivity) consequences in various areas. Specifically, employment intensity in the regions of the South and the Islands has been and still is far lower than elsewhere. This is consistent with the evidence that the development gap of these regions depends more on low employment rates than on productivity levels (Bracalente and Perugini, 2006). Moreover, again tentatively, one may hypothesise adverse distributional effects of low employment elasticity in the South and Islands, where output growth translates prevalently into productivity growth. The share of these gains which flows to wages (or, alternatively, profits) depends on the competitive levels of the markets; however, given the low employment rates, the share going to wages also benefits a relatively limited part of the population (of course, much also depends on the sector differences of employment elasticity and of competitive levels).

Examination of sector-specific elasticities (to sector VA and GDP), beyond the obvious outcomes of a low level of agriculture and manufacturing compared with services, also provides interesting evidence described in the text. The most important point, in our opinion, is related to the manufacturing sector, and will provide stimulus for further research - i.e., the capacity of employment elasticity to describe remarkably different dynamics of structural change in differing industrial contexts. In particular, although within a general restructuring process, our analysis

highlights the capacity of the North-Eastern industrial model (largely based on light and diffused industrialisation) to cope with structural developments, compared with the massive and persisting crisis of the North-West (historically the Fordist, large-scale industrialisation) model. This suggests that more in-depth analysis of the relationship between the structural characteristics of the manufacturing systems and labour market responsiveness to output change is desirable. Of course, the basic unit of analysis for this kind of study should be consistent with the objective of classifying various productive systems according to features which have a significant impact on the labour market (levels of specialisation, prevailing size of firms, etc.). From this point of view, future research efforts may be oriented towards study of the employment intensity of manufacturing growth in local labour systems (LLS), after having verified the possibility of effectively and correctly employing the available estimated data on value added and employment at this territorial level.

Lastly, another useful (and natural) development of this study may be its extension to European level, in view of the deep existing regional differences and the interest generated by entering the scene of important differences in countries' institutional settings.

APPENDIX

Table A1. Dynamics of employment intensity of GDP growth in Italy and geographical divisions

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
North-West	0.21	0.22	0.21	0.17	0.14	0.15	0.19	0.20	0.24	0.24	0.22	0.24	0.24	0.22	0.17	0.08	-0.05	-0.13	-0.23	-0.19	-0.04	0.13	0.27	0.40	0.55
North-East	0.37	0.40	0.42	0.44	0.44	0.42	0.44	0.42	0.41	0.36	0.31	0.29	0.28	0.24	0.18	0.12	0.06	0.01	-0.02	0.02	0.11	0.21	0.31	0.42	0.52
Centre	0.36	0.38	0.41	0.41	0.42	0.45	0.50	0.51	0.52	0.43	0.34	0.28	0.21	0.14	0.04	-0.05	-0.12	-0.16	-0.16	-0.08	0.03	0.16	0.30	0.45	0.62
South & Islands	0.23	0.25	0.26	0.26	0.25	0.25	0.25	0.26	0.25	0.22	0.22	0.20	0.17	0.10	0.00	-0.12	-0.24	-0.35	-0.36	-0.29	-0.15	0.03	0.17	0.30	0.39
<i>Italy</i>	0.30	0.31	0.33	0.32	0.32	0.31	0.33	0.33	0.33	0.29	0.26	0.24	0.22	0.16	0.09	0.00	-0.09	-0.16	-0.18	-0.13	-0.02	0.12	0.25	0.38	0.49

Table A2. Dynamics of employment intensity of Value Added growth in Italy and geographical divisions, Agriculture (A)

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
North-West	0.22	-0.08	-0.25	-0.28	-0.29	-0.29	-0.24	-0.22	-0.18	-0.23	-0.40	-0.23	-0.21	-0.45	-0.62	-0.93	-0.99	-1.03	-1.11	-1.19	-1.22	-1.26	-1.24	-0.78	-0.43
North-East	-0.35	-0.56	-0.38	-0.31	-0.22	-0.10	-0.07	-0.10	-0.11	-0.17	-0.32	-0.32	-0.47	-0.72	-0.95	-1.10	-1.00	-0.83	-0.89	-0.87	-0.98	-1.03	-0.97	-0.64	-0.52
Centre	-0.21	-0.28	-0.25	-0.45	-0.45	-0.08	-0.16	-0.28	0.13	0.28	0.30	0.55	0.34	0.36	-0.54	-1.17	-0.84	-1.00	-2.87	-2.70	-2.37	-1.93	-1.24	0.25	0.47
South & Islands	0.18	0.00	-0.07	-0.17	-0.11	-0.11	-0.19	-0.02	0.10	0.23	0.28	0.08	-0.01	0.06	0.05	0.02	-0.04	-0.11	-0.21	-0.28	-0.37	-0.37	-0.32	-0.17	-0.07
<i>Italy</i>	0.06	-0.14	-0.21	-0.26	-0.22	-0.17	-0.19	-0.13	-0.02	0.08	0.13	0.04	-0.05	-0.07	-0.19	-0.32	-0.38	-0.41	-0.53	-0.55	-0.65	-0.75	-0.60	-0.30	-0.11

Table A3. Dynamics of employment intensity of Value Added growth in Italy and geographical divisions, Industry in the strict sense (INSS)

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
North-West	0.03	-0.04	-0.11	-0.19	-0.21	-0.26	-0.23	-0.21	-0.31	-0.30	-0.25	-0.24	-0.11	0.33	0.47	0.50	0.67	0.76	0.76	0.59	0.38	0.21	0.25	0.24	0.39
North-East	0.31	0.32	0.37	0.39	0.36	0.31	0.32	0.23	0.26	0.26	0.23	0.23	0.23	0.24	0.17	0.10	0.04	-0.02	-0.03	0.01	0.09	0.16	0.27	0.37	0.53
Centre	0.58	0.59	0.60	0.55	0.45	0.37	0.33	0.24	0.11	0.03	-0.05	-0.07	-0.08	-0.07	-0.13	-0.15	-0.16	-0.18	-0.17	-0.11	-0.04	0.02	0.10	0.13	0.20
South & Islands	0.50	0.56	0.59	0.57	0.46	0.40	0.39	0.34	0.31	0.19	0.17	0.20	0.26	0.30	0.37	0.40	0.45	0.49	0.56	0.59	0.59	0.63	0.63	0.63	0.64
<i>Italy</i>	0.44	0.46	0.46	0.41	0.32	0.26	0.22	0.17	0.14	0.10	0.09	0.10	0.15	0.23	0.25	0.26	0.30	0.33	0.38	0.41	0.42	0.46	0.49	0.50	0.53

Table A4. Dynamics of employment intensity of Value Added growth in Italy and geographical divisions, Building and Construction Sector (C)

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
North-West	0.58	0.48	0.42	0.37	0.31	0.36	0.60	0.50	0.55	0.45	0.37	0.42	0.38	0.38	0.41	0.36	0.29	0.28	0.26	0.25	0.21	0.15	0.05	0.00	-0.02
North-East	-0.25	-0.06	0.09	0.14	0.16	0.19	0.25	0.26	0.27	0.31	0.44	0.51	0.50	0.52	0.50	0.42	0.35	0.32	0.27	0.30	0.20	0.28	0.28	0.33	0.36
Centre	0.14	-0.10	-0.02	0.09	0.09	0.14	0.20	0.26	0.37	0.22	0.13	0.19	0.20	0.25	0.23	0.24	0.06	-0.01	-0.02	-0.06	-0.06	0.07	0.10	0.23	0.42
South & Islands	0.11	0.08	0.04	0.01	0.02	0.00	-0.02	-0.07	-0.05	0.06	0.13	0.19	0.21	0.41	0.36	0.35	0.38	0.36	0.38	0.42	0.44	0.39	0.34	0.17	0.19
<i>Italy</i>	0.23	0.16	0.16	0.14	0.12	0.11	0.16	0.16	0.19	0.22	0.26	0.32	0.33	0.39	0.38	0.35	0.30	0.28	0.28	0.30	0.27	0.23	0.17	0.15	0.20

Table A5. Dynamics of employment intensity of Value Added growth in Italy and geographical divisions, Market Services (MS)

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
North-West	0.73	0.69	0.62	0.56	0.53	0.51	0.55	0.59	0.63	0.66	0.71	0.66	0.62	0.57	0.49	0.45	0.38	0.35	0.34	0.34	0.44	0.50	0.57	0.69	0.81
North-East	0.54	0.54	0.52	0.53	0.52	0.52	0.57	0.63	0.69	0.72	0.73	0.65	0.64	0.59	0.55	0.45	0.39	0.36	0.34	0.33	0.38	0.43	0.50	0.62	0.72
Centre	0.60	0.64	0.66	0.71	0.79	0.86	0.98	1.04	1.07	0.98	0.86	0.72	0.58	0.44	0.28	0.16	0.13	0.14	0.21	0.31	0.41	0.48	0.58	0.72	0.87
South & Islands	0.62	0.63	0.62	0.63	0.68	0.75	0.85	0.93	0.94	0.89	0.82	0.70	0.58	0.44	0.27	0.12	0.00	-0.12	-0.06	0.09	0.27	0.40	0.54	0.69	0.79
<i>Italy</i>	<i>0.62</i>	<i>0.62</i>	<i>0.60</i>	<i>0.60</i>	<i>0.61</i>	<i>0.65</i>	<i>0.73</i>	<i>0.81</i>	<i>0.86</i>	<i>0.84</i>	<i>0.80</i>	<i>0.69</i>	<i>0.60</i>	<i>0.48</i>	<i>0.35</i>	<i>0.23</i>	<i>0.16</i>	<i>0.11</i>	<i>0.15</i>	<i>0.23</i>	<i>0.35</i>	<i>0.44</i>	<i>0.55</i>	<i>0.68</i>	<i>0.79</i>

Table A6. Dynamics of employment intensity of Value Added growth in Italy and geographical divisions, Non-Market Services (NMS)

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
North-West	0.86	0.92	0.96	0.97	0.97	0.99	0.97	0.95	0.98	0.94	0.90	0.92	0.96	0.98	0.94	0.92	0.90	0.69	0.42	0.35	0.39	0.47	0.51	0.54	0.54
North-East	0.85	0.82	0.81	0.79	0.83	0.80	0.76	0.73	0.70	0.60	0.50	0.44	0.39	0.32	0.21	0.22	0.22	0.22	0.26	0.33	0.40	0.52	0.68	0.73	0.70
Centre	0.66	0.64	0.69	0.75	0.80	0.91	0.97	1.00	1.03	1.02	0.99	0.98	0.97	0.96	0.93	0.90	0.86	0.77	0.58	0.41	0.29	0.32	0.45	0.54	0.59
South & Islands	0.71	0.68	0.68	0.70	0.73	0.79	0.84	0.88	0.96	1.10	1.52	1.49	1.43	1.32	1.20	1.11	0.99	0.85	0.61	0.20	0.14	0.23	0.35	0.34	0.30
<i>Italy</i>	<i>0.75</i>	<i>0.73</i>	<i>0.73</i>	<i>0.74</i>	<i>0.78</i>	<i>0.83</i>	<i>0.86</i>	<i>0.88</i>	<i>0.93</i>	<i>0.96</i>	<i>1.00</i>	<i>0.96</i>	<i>0.93</i>	<i>0.87</i>	<i>0.77</i>	<i>0.68</i>	<i>0.63</i>	<i>0.56</i>	<i>0.44</i>	<i>0.33</i>	<i>0.33</i>	<i>0.42</i>	<i>0.52</i>	<i>0.55</i>	<i>0.53</i>

Table A7. Sector employment elasticities to GDP growth , Italy

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
A	-0.64	-0.60	-0.58	-0.65	-0.69	-0.77	-0.93	-1.04	-1.25	-1.48	-1.56	-1.52	-1.53	-1.74	-1.94	-2.07	-2.28	-2.42	-2.46	-2.41	-2.29	-2.09	-1.93	-1.81	-1.76
INSS	0.66	0.63	0.60	0.48	0.33	0.17	0.00	-0.20	-0.30	-0.41	-0.37	-0.23	-0.15	-0.13	-0.11	-0.09	-0.14	-0.18	-0.17	-0.06	0.08	0.21	0.33	0.39	0.34
C	-0.43	-0.29	-0.23	-0.13	-0.06	0.00	0.06	0.00	-0.10	-0.31	-0.42	-0.35	-0.25	-0.18	-0.12	-0.22	-0.34	-0.42	-0.52	-0.55	-0.38	-0.09	0.17	0.44	0.80
MS	0.71	0.71	0.69	0.72	0.75	0.81	0.94	1.06	1.16	1.18	1.13	0.94	0.79	0.66	0.49	0.34	0.23	0.18	0.21	0.33	0.48	0.62	0.76	0.93	1.11
NMS	0.77	0.77	0.80	0.85	0.91	0.94	1.04	1.07	1.10	1.05	0.91	0.84	0.79	0.74	0.65	0.56	0.50	0.39	0.25	0.14	0.12	0.16	0.23	0.28	0.34

Table A8. Sector employment elasticities to GDP growth , North-West

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
A	-1.10	-0.89	-0.80	-0.86	-0.77	-0.74	-0.65	-0.71	-0.80	-0.97	-1.18	-1.22	-1.34	-1.61	-1.92	-2.25	-2.75	-2.97	-3.44	-3.57	-3.08	-2.63	-2.37	-2.20	-2.16
INSS	-0.07	-0.09	-0.11	-0.21	-0.37	-0.50	-0.68	-0.83	-0.86	-0.88	-0.89	-0.80	-0.78	-0.76	-0.68	-0.76	-0.93	-1.03	-1.09	-0.90	-0.54	-0.29	-0.14	-0.08	-0.13
C	-0.68	-0.64	-0.61	-0.35	-0.14	0.07	0.37	0.52	0.67	0.62	0.56	0.63	0.64	0.64	0.76	0.59	0.33	0.19	-0.06	-0.07	-0.14	0.00	0.28	0.61	1.10
MS	0.89	0.82	0.72	0.65	0.65	0.66	0.73	0.76	0.80	0.84	0.89	0.81	0.73	0.67	0.55	0.48	0.41	0.39	0.37	0.39	0.52	0.62	0.73	0.88	1.11
NMS	0.84	0.87	0.92	0.92	0.90	0.88	0.96	1.02	1.10	1.04	0.85	0.86	0.91	0.92	0.82	0.73	0.68	0.58	0.42	0.38	0.30	0.36	0.41	0.48	0.56

Table A9. Sector employment elasticities to GDP growth , North-East

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
A	-0.52	-0.38	-0.27	-0.18	-0.07	-0.05	-0.09	-0.19	-0.48	-0.91	-1.16	-1.17	-1.17	-1.37	-1.55	-1.55	-1.67	-1.81	-1.86	-1.86	-1.77	-1.66	-1.52	-1.39	-1.54
INSS	0.42	0.37	0.34	0.23	0.13	0.04	-0.08	-0.15	-0.05	0.08	0.19	0.26	0.26	0.23	0.14	0.08	-0.01	-0.10	-0.13	-0.04	0.10	0.19	0.26	0.31	0.25
C	-0.34	-0.15	-0.03	0.12	0.18	0.22	0.27	0.16	0.04	-0.06	-0.12	-0.04	0.06	0.18	0.34	0.22	0.14	-0.02	-0.22	-0.27	-0.17	0.01	0.21	0.45	0.80
MS	0.63	0.64	0.64	0.68	0.67	0.67	0.77	0.85	0.90	0.90	0.85	0.75	0.71	0.67	0.62	0.50	0.43	0.41	0.39	0.38	0.45	0.52	0.61	0.76	0.93
NMS	0.79	0.77	0.77	0.79	0.83	0.82	0.88	0.86	0.84	0.67	0.46	0.40	0.36	0.31	0.23	0.23	0.22	0.18	0.18	0.23	0.26	0.33	0.43	0.48	0.57

Table A10. Sector employment elasticities to GDP growth , Centre

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
A	-0.42	-0.39	-0.35	-0.48	-0.61	-0.77	-1.00	-1.18	-1.54	-2.02	-2.20	-2.26	-2.27	-2.51	-2.74	-2.93	-3.21	-3.23	-3.14	-3.03	-2.80	-2.40	-2.09	-1.90	-1.76
INSS	0.81	0.77	0.71	0.57	0.42	0.28	0.11	-0.13	-0.29	-0.46	-0.47	-0.36	-0.32	-0.34	-0.37	-0.39	-0.46	-0.50	-0.53	-0.42	-0.24	-0.10	0.04	0.12	0.17
C	-0.68	-0.52	-0.46	-0.45	-0.35	-0.24	-0.18	-0.12	-0.05	-0.16	-0.17	-0.04	0.12	0.27	0.24	0.10	-0.04	-0.13	-0.25	-0.33	-0.25	0.00	0.29	0.58	1.01
MS	0.65	0.67	0.70	0.78	0.87	0.97	1.17	1.30	1.39	1.34	1.17	0.93	0.71	0.53	0.35	0.21	0.17	0.20	0.31	0.48	0.64	0.75	0.87	1.02	1.22
NMS	0.57	0.54	0.58	0.66	0.72	0.78	0.89	0.94	1.04	1.05	0.98	0.91	0.84	0.83	0.79	0.69	0.64	0.52	0.36	0.24	0.16	0.18	0.24	0.32	0.44

Table A11. Sector employment elasticities to GDP growth , South & Islands

	70-80	71-81	72-82	73-83	74-84	75-85	76-86	77-87	78-88	79-89	80-90	81-91	82-92	83-93	84-94	85-95	86-96	87-97	88-98	89-99	90-00	91-01	92-02	93-03	94-04
A	-0.72	-0.79	-0.86	-0.98	-1.10	-1.24	-1.47	-1.58	-1.73	-1.77	-1.68	-1.54	-1.50	-1.68	-1.78	-1.94	-2.12	-2.27	-2.23	-2.13	-2.15	-2.05	-1.97	-1.87	-1.76
INSS	0.97	1.00	0.96	0.83	0.65	0.48	0.30	0.05	-0.15	-0.37	-0.37	-0.17	-0.03	0.03	0.08	0.19	0.23	0.29	0.37	0.42	0.47	0.60	0.69	0.73	0.60
C	-0.26	-0.15	-0.12	-0.06	-0.03	-0.06	-0.09	-0.28	-0.60	-0.97	-1.16	-1.13	-1.03	-1.06	-1.05	-1.13	-1.31	-1.29	-1.18	-1.09	-0.72	-0.26	0.04	0.31	0.61
MS	0.74	0.74	0.72	0.73	0.79	0.88	1.03	1.20	1.37	1.41	1.37	1.12	0.90	0.71	0.45	0.20	0.00	-0.16	-0.10	0.15	0.39	0.61	0.81	0.99	1.14
NMS	0.85	0.86	0.90	0.97	1.05	1.12	1.23	1.26	1.27	1.23	1.14	1.05	0.98	0.93	0.84	0.72	0.64	0.46	0.17	-0.06	-0.08	-0.03	0.03	0.08	0.12

Diagram A1. Dynamics of sector employment elasticity to (sector) Value Added growth in Italy and geographical divisions

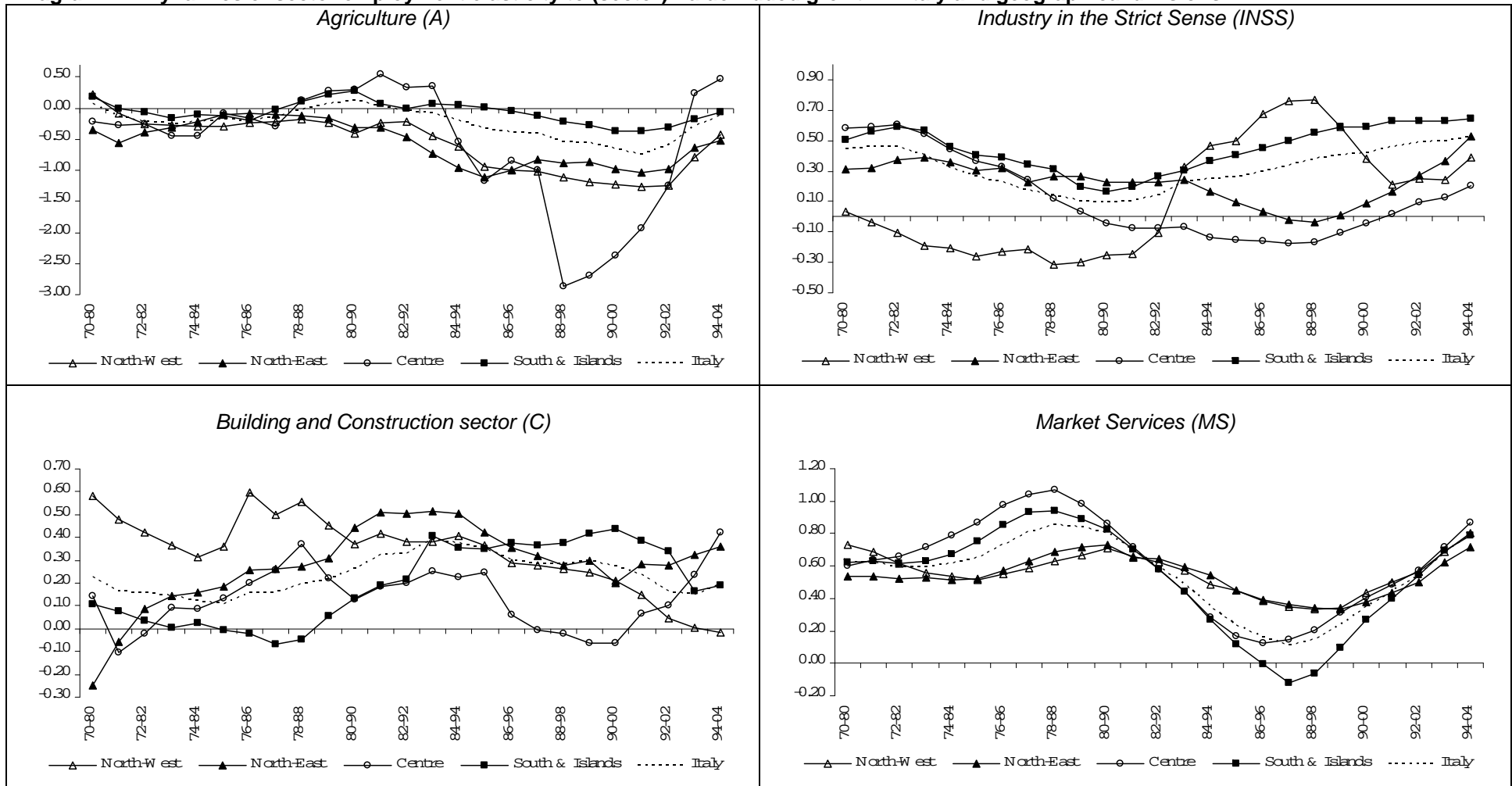


Diagram A1. Dynamics of the sector employment elasticity to (sector) Value Added growth in Italy and geographical divisions (*continued*)

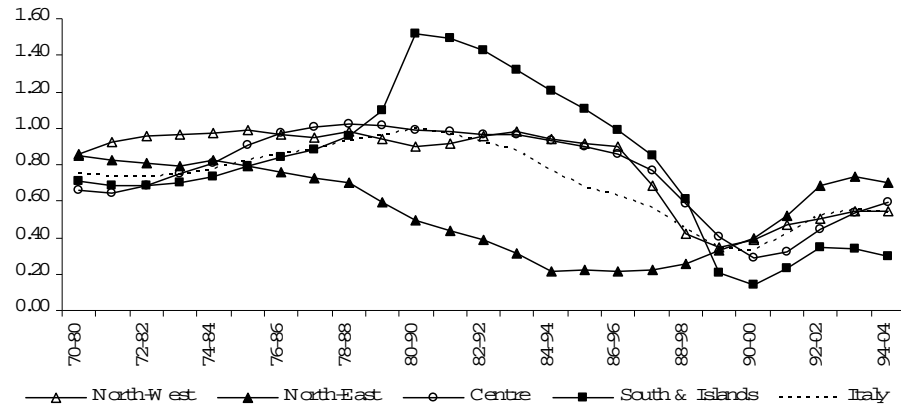
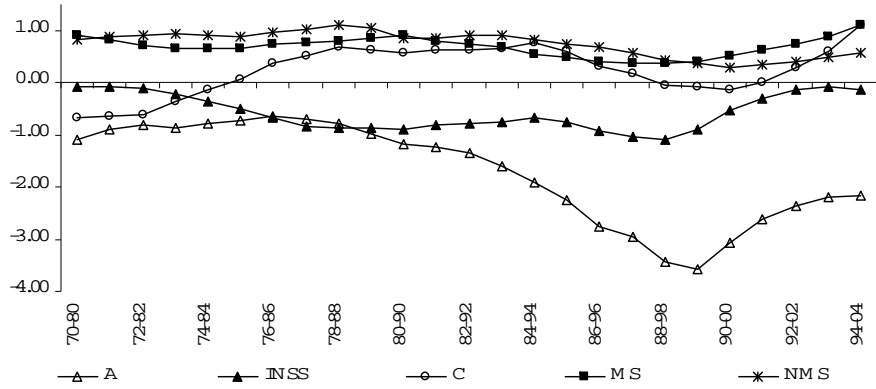
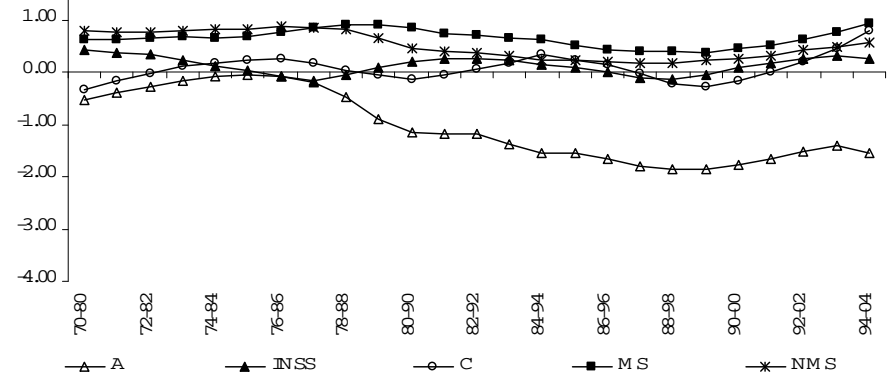


Diagram A2. Dynamics of sector employment elasticity to total GDP growth in the geographical divisions

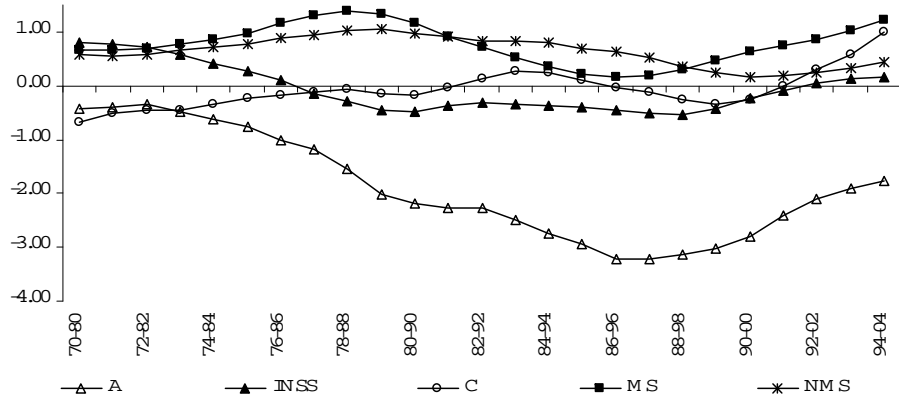
North-West



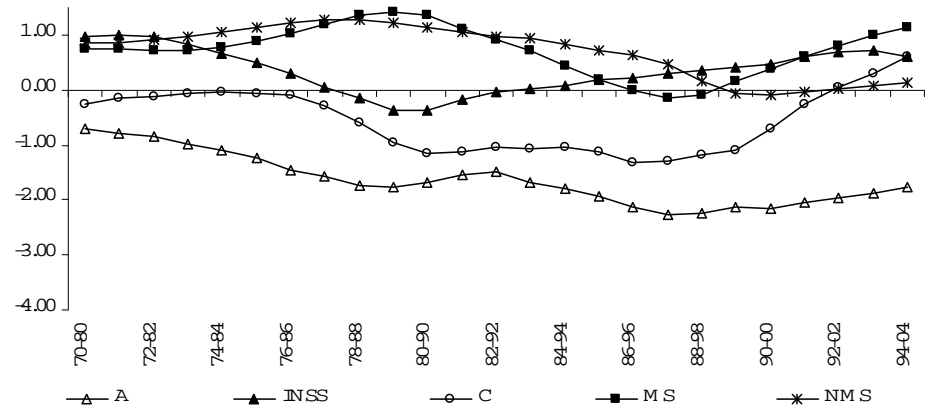
North-East



Centre



South & Islands



References

- Adams, C. and Coe, D.T. (1989), A systems approach to estimating the natural rate of unemployment and potential output for the United States, *IMF Working Papers*, 89/89.
- Adanu, K. (2005), A cross-province comparison of Okun's coefficient for Canada, in *Applied Economics*, 37, pp. 561–570.
- Apergis, N. and Rezitis, A. (2003), An examination of Okun's Law: evidence from regional areas in Greece, in *Applied Economics*, 35, pp. 1147–1151.
- Attfeld, C. L. F. and Silverstone, B. (1997), Okun's coefficient: a comment, in *Review of Economics and Statistics*, 79, pp. 326-29.
- Baici, E. and Samek Lodovici, M. (2001), *La disoccupazione: modelli, diagnosi e strategie per il mercato del lavoro in Italia*, Rome, Carocci.
- Baker, D. and Schmitt, J. (1999), The Macroeconomic Roots of High Unemployment: The Impact of Foreign Growth, *Economic Policy Institute*, available at <http://www.epinet.org>.
- Bean, C. R. (1994), European unemployment: a survey, in *Journal of Economic Literature*, 32, June, pp. 573-619.
- Blanchard, O. (2005), European unemployment: the evolution of facts and ideas, *NBER Working Papers*, n. 11750.
- Boltho, A. and Glyn, A. (1995), Can macroeconomic policies raise employment?, in *International Labour Review*, 4-5, pp. 452-470.
- Bracalente, B. and Perugini, C. (2006), The components of regional disparities in Europe, paper presented at the XXVII Italian Conference of Regional Science, held in Pisa (I), 12-14 October 2006.
- Buscher, H.S. and Müller, C. (1999), Exchange rate volatility effects on the German labor market: a survey of recent results and extensions, *IZA Working Paper*, n. 37.
- Christopoulos, D.K. (2004), The relationship between output and unemployment: evidence from Greek regions, in *Papers in Regional Science*, 83, pp. 611-620.
- Courtney, H.G. (1991), The Beveridge curve and Okun's law: A re-examination of fundamental relationships in the United States, *Ph.D. thesis*, Massachusetts Institute of Technology.
- Cuaresma, J.C. (2003), Okun's law revisited, in *Oxford Bulletin of Economics and Statistics*, 65, pp. 439-451.
- Dopke, J. (2001), The employment intensity of growth in Europe, *Kiel Working Paper*, n. 1021, Kiel Institute of World Economics, Germany.
- Elhorst, P.J. (2003), The mystery of regional unemployment differentials: theoretical and empirical explanations, in *Journal of Economic Surveys*, 17, pp. 709-748.
- Erber, G. (1994), Verdoorn's or Okun's law?, *German Institute for Economic Research Discussion Paper*, n. 98, Berlin.
- Eurostat (1996), *European system of accounts: ESA 1995*, Luxembourg.
- Flaig, G. and Rottmann, H. (2000), Input demand and the short- and the long-run employment thresholds. An empirical analysis for the German manufacturing sector', *CESifo Working Paper*, n. 264.
- Freeman, D. G. (2000), A regional test of Okun's Law, in *International Advances in Economic Research*, 6, pp. 557–70.
- Freeman, D.G. (2001), Panel tests of Okun's law for ten industrial countries, in *Economic Inquiry*, 39, pp. 511-523.
- Gabrisch, H. (2005), The employment-GDP intensity in new member countries and its causes. An empirical analysis, paper presented at the MET Network 16th Research Conference, Wroclaw, 15th April 2005, Poland.
- Gabrisch, H. and Buscher, H. (2005), The unemployment-growth relationship in transition countries, *IWH Discussion Paper*, n. 5, Halle Institute for Economic Research, Germany.
- Garibaldi, P. and Mauro, P. (2002), Anatomy of employment growth, in *Economic Policy*, 1, pp. 67-113.
- Gordon, R.J. (1984), Unemployment and potential output in the 1980s, *Brooking Papers on Economic Activity*, 2, pp. 537-586.
- Hamermesh, D. and Pfann, G.A. (1996), Adjustment costs in factor demand, in *Journal of Economic Literature*, 34, pp. 1264-1292.
- Harris, R. and Silverstone, B. (2001), Testing for asymmetry in Okun's Law: a cross-country comparison, *Economic Bulletin*, 5, pp. 1–13.
- Islam, I. and Nazara, S. (2000), Estimating employment elasticity for the Indonesian economy, *ILO Technical Note*, Jakarta.
- Islam, R. (2004), *The nexus of economic growth, employment and poverty reduction: an empirical analysis*, *ILO Report*, Recovery and Reconstruction Department, Geneva.
- Istat (2004), Metodologie di stima degli aggregati di contabilità nazionale a prezzi correnti. Italia – inventario SEC 95, in *Metodi e Norme*, n.21, Rome, Istat.

- Istat (2005), Brevi cenni sulle metodologie di stima dell'occupazione non regolare nell'ambito della contabilità Nazionale, available at:
www.istat.it/salastampa/comunicati/non_calendario/20051216_01/note_metodologiche.pdf
- Izyumov, A. and Vahaly, J. (2002), The unemployment-output trade-off in transition economies: Does Okun's law apply?, in *Economics of Planning*, 35, pp. 317-331.
- Landmann, O. (2004), Employment, productivity and output growth, *ILO Employment Strategy Papers*, n. 7.
- Lee, J. (2000), The robustness of Okun's law: evidence from OECD countries', in *Journal of Macroeconomics*, 22, pp. 331-356.
- Maddison, A. (1991), *Dynamic forces in capitalist development: a long-run comparative view*, Oxford, Oxford University Press.
- Mazumdar, D. (2003), Trends in employment and the employment elasticity in manufacturing, 1971-92: an international comparison, in *Cambridge Journal of Economics*, 27, pp. 563-582.
- Mayes, D. and Viren, M. (2002), Asymmetry and the problem of aggregation in the Euro area, in *Empirica*, 29, pp. 47-73.
- Moosa, I.A. (1997), A cross-country comparison of Okun's coefficient, in *Journal of Comparative Economics*, 24, pp. 335-356.
- Mourre, G. (2004), Did the pattern of aggregate employment growth changed in the euro area in the late 1990s?, *European Central Bank Working Paper Series*, n. 358, Frankfurt.
- Nickell, S. (1986), Dynamic models of labour demand, in *Handbook of Labour Economics, volume 1*, Edited by O. Ashenfelter and R. Layard, Elsevier Science Publishers, pp. 473-522.
- Kahn, A.R. (2001), Employment policies for poverty reduction, *ILO Issues in Employment and Poverty Discussion Paper*, n.1, Geneva.
- Kangasharju, A. and Pehkonen, J. (2001), Employment-output link in Finland: evidence from regional data, in *Finnish Economic Papers*, 1, pp. 41-50.
- Kapsos, S. (2005), The employment intensity of growth: trends and macroeconomic determinants, *ILO Employment Strategy Papers*, n. 12.
- Kaufman, R. (1988), An international comparison of Okun's law, in *Journal of Comparative Economics*, 12, pp. 189-203.
- Okun, A.M. (1962), Potential GNP: Its Measurement and Significance, in *Proceedings of the Business and Economic Statistics Section of the American Statistical Association*, pp. 98-104.
- Okun, A. M. (1970), Potential GNP: its Measurement and Significance, appendix in Okun A., *The Political Economy of Prosperity*, New York, Norton.
- Padalino, S. and Vivarelli, M. (1997), The Employment Intensity of Growth in the G-7 Countries, in *International Labour Review*, 136, pp. 199-213.
- Pehkonen, J. (2000), Employment, unemployment and output growth in booms and recessions: time series evidence from Finland, 1970-1996, in *Applied Economics*, 32, pp. 885-900
- Palley, T.I. (1993), Okun's law and the asymmetric and changing cyclical behaviour of the USA economy, in *International Review of Applied Economics*, 7, pp. 144-162.
- Perman, R. and Tavera, C. (2005), A cross-country analysis of the Okun's law coefficient convergence in Europe, in *Applied Economics*, 37, pp. 2501-2513.
- Perugini, C. and Signorelli, M. (2006), Determinants of (un)employment differentials and dynamics across EU-15 countries and regions, paper presented at the *9th Bi-Annual Conference of the European Association for Comparative Economics Studies (EACES)*, Brighton (UK), 7-9 September 2006.
- Prachowny, M.J.F. (1993), Okun's law: theoretical foundations and revisited estimates, in *The Review of Economics and Statistics*, 30, pp. 331-336.
- Revenga, A.L. and Bentolilla, S. (1995), What affect the employment intensity of growth?, *Discussion Paper of the Bank of Spain*, n. 9517.
- Saget, C. (2000), Can the level of employment be explained by GDP growth in Transition Countries (theory versus the quality of data), *ILO Development Policy Group*, Geneva.
- Sapir, A. (ed.) (2004), *An agenda for growing Europe: the Sapir report*, Oxford, Oxford University Press.
- Schnabel, G. (2002), Output trends and Okun's Law, *BIS Working Paper*, n. 111, Bank for International Settlements.
- Silvapulle, P., Moosa, I.A. and Silvapulle, M.J. (2004), Asymmetry in Okun's law, in *Canadian Journal of Economics*, 37, pp. 353-374.
- Sogner, L. and Stiassny, A. (2002), An analysis on the structural stability of Okun's Law - a cross country study, in *Applied Economics*, 34, pp. 1775-1787.
- Solow, R. M. (1990), *Labour Market as a Social Institution*, Oxford, Basil Blackwell.
- Solow, R. M. (2000), Unemployment in the United States and in Europe: a contrast and the reasons, *CESifo Working Paper Series*, n. 231.
- Stirböck, C. and Buscher, H.S. (2000), Exchange rate volatility effects on labor markets, in *Intereconomics*, 35, pp. 9-21.
- Virén, M. (2001), The Okun curve is non-linear, in *Economic Letters*, 70, pp. 253-257.

Weber, C.E. (1995), Cyclical output, cyclical unemployment, and Okun's coefficient: a new approach, in *Journal of Applied Econometrics*, 10, pp. 433–446.

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