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SPATIAL EXTERNALITIES AND LOCAL: ECONOMIC GROWTH

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SPATIAL EXTERNALITIES AND LOCAL ECONOMIC GROWTH*

Abstract
A vast body of literature has addressed in the last decade the influence of local externalities on industry location and growth. This literature has, however, paid not too much attention to the wider scenario where such phenomena are rooted, that of an ongoing process of structural change which is transforming our economies from manufacturing to service ones.
The main objective of this paper is to assess the role of a large set of potential determinants on the process of local agglomeration of economic activity distinguishing between manufacturing and service sectors.
We focus on the case of Italy making use of a very ample database on socio-economic indicators for 784 Local Labour Systems and 34 sectors over the period 1991-96. Our database covers both the manufacturing and the service sectors so that the whole economic system is considered.
Our econometric results show that local growth in Italy is not a homogeneous process. On the contrary, it is characterized by significant differences across macro regions and especially across sectors. Among the most important determinants of local industry growth, it is worth mentioning the positive role of the diversity externalities. We also find robust evidence of the negative influence of specialisation externalities on labour dynamics at the local industry level. Moreover, we have assessed the effects of other determinants of local growth like human capital, social environment and network externalities. Finally, the spatial analysis shows that in the aggregate economy and also in some sectors there is spatial autocorrelation and, therefore, dynamic spatial models have to be estimated.
JEL: R11, R12, L60, O52
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1. Introduction

A vast body of literature has addressed in the last decade the influence of externalities on local growth (starting from Glaser *et al.*, 1992 , until Henderson, 2003, to mention just a few). This literature has, however, paid not too much attention to the wider scenario where such phenomena are rooted, that of an ongoing process of structural change which is transforming our economies from manufacturing to service ones[1]. Such a process has insightful implications for the analysis of the geography of economic activities. In fact, the spatial distribution and functioning of the industrial economies have been shaped by the characteristics of prevailing production and distribution technologies, modes of work organization and, most importantly, factors mobility. All these features are, nowadays, dramatically changing due to the dislocation and deverticalisation of mass production industries followed by the development of new service activities, the transformation of cultural and leisure activities from pastimes into economic business and the emerging role of information and communications technologies. These trends are modifying both the economic geography of local production systems and the manner in which these are linked to a broader economy. Economic landscapes are increasingly being shaped by a complex mixture of forces operating simultaneously at a global, national and local level with a common denominator: the structural shift from manufacturing to services. The main signal of such phenomenon in the geographical space being the fact that urban areas are losing manufacturing to become more service oriented.

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[1] Most analysis have in fact concentrated on manufacturing sectors alone. The main notable exceptions being those of Combes (2000) for France who considers 42 service sectors and, more recently, Almeida for Portugal who analyses 32 sectors. Dekle (2002) also considers the service sectors but at a very aggregated level.

The main aim of this paper is to analyse local short-run economic performance, as expressed by employment dynamics, both in the service and in the manufacturing sectors. Thanks to a large dataset we attempt to explain some of the differences in the economic performance of sectors[2] by assessing the role of several potential determinants of local employment dynamics.

In particular, we aim at introducing a useful classification of determinants in order to present a general setting for testing different potential explanatory scenarios. Such a classification includes the usual distinction among specialisation (or Marshall) externalities, coming from the scale of local own industry activity, and urbanization (or Jacobs) economies, due to cross-fertilization enhanced by the scale or diversity of activity outside the own industry. Moreover other important phenomena are included both at the local industry level (scale and competition effects) and at the local level (population size effects, human and social capital, among others). Finally, the use of spatial econometric techniques allows us to avoid placing artificial bounds to agglomeration economies. In other words, we do not consider our geographical units as isolated closed economies[3] by taking into account the possibility of some externalities crossing borders.

The paper is organised as follow. In the next section we briefly survey the literature background. In the third section data are presented along with a descriptive picture of the phenomenon under examination. The fourth section presents the estimation procedure and some detailed discussion on the indicators being used. The fifth section discusses the main econometric results. In the last section some concluding remarks are proposed.

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[2] The analysis of differences across areas, but just in the manufacturing, has been mainly pursued in Usai and Paci, 2003.

[3] Especially in the United States, most studies, (Glaeser *et al.*, 1992, and Henderson *et al.*, 1995) have relied on the city as the geographic unit of analysis, so they had necessarily to consider them as economic islands.

2. Some theoretical and empirical issues

In the last decade, the influence of regional externalities on local economic growth has been under recurrent investigation. Glaeser *et al.* (1992) were the first to focus on employment growth as a proxy for local economic performance and to study its dynamics at both the city and the sectoral level. The empirical analysis was based on the discrimination between static externalities, associated with cost efficiencies or pecuniary externalities, and dynamic externalities, related to knowledge spillovers. Static externalities are those which affect industry localization, but not growth. Since then, the debate about dynamic externalities has mainly focused on two competing theories[4]: those of Marshall (1920) [5]-Arrow (1962)-Romer (1986) (MAR) and of Jacobs (1969).

The main difference between these theories concerns the effects of specialization (the degree to which a location specializes in one industry) and diversity (the range of different industries in a location). The MAR framework maintains that most spillovers occur among firms in the same industry. Specialized locations with high levels of industry concentration should experience more innovation and faster growth. In contrast, Jacobs posits that the most important knowledge flows take place across different industries. Jacobs' theory predicts that industries will innovate more and grow faster in locations with greater diversity. Empirical tests addressing this debate have produced conflicting results.

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[4] In fact Glaeser *et al.* (1992) included also Porter's arguments in contrast to Jacobs' and Marshall's ones. According to Porter (1990) urban areas which are very specialized may convey a boost on growth thanks to competitive effects.

[5] Marshall identified three causes (1) specialized labor forces and the generation of new ideas, arising from face-to-face communications and human capital accumulation, (2) the availability of specialized inputs and infrastructure, (3) economies of mass production. In Marshall's view, firms tend to co-locate with their buyers and suppliers, which creates positive externalities arising from transportation, communication, and coordination efficiencies.

Glaeser *et al.* (1992) finds that both competition and diversity fostered industry growth and innovation, while specialization discouraged them. The evidence collected for other countries, mainly in the European Union, seems to support these findings. For the case of Italy, Usai and Paci (2003), at the local labour system level, found a positive effect on growth played by diversity and a negative one by specialization. In the Netherlands, at the city level for just top industries, van Soest *et al.* (2002) found similar results. Combes (2000b), for France, and Almeida (2003), for Portugal, are the only two previous contributions who examine both the manufacturing and the service sector[6]. Such a choice proves insightful given that, although, on average, there is a positive role for diversity and a negative one for specialization, such externalities are different across sectors. The common feature of such studies is that they analyse short time spans and that, due to lack of data, they focus on employment dynamics as a proxy of productivity growth.

These results conflict with those of Henderson *et al.* (1995) who reported positive effects for both diversity and specialization externalities for high tech industries whilst for mature industries just MAR spillovers are found. Similar results have been reached also by Forni and Paba (2002), who found that specialization and variety matter for growth in most manufacturing sectors even though they show that each industry needs its own variety in terms of input-output relations. These interesting outcomes are, though, subject to Combes' critique (2000a), according to which the simultaneous inclusion of a specialisation index and of total employment among the regressors introduces a positive bias on

[6] However, in Combes (2000b) the significance levels of results are not given when it comes to sector by sector regressions.

the specialisation coefficient[7]. The positive effect of specialisation is therefore questioned.

More compelling is the contribution of recent papers (Cingano and Schivardi, 2003, Dekle, 2002, and Henderson, 2003) where some typical flaws affecting the aforementioned studies are sidestepped. Such flaws depend on the idea that employment growth is used as a proxy of productivity changes while overlooking the fact that this not unrealistic in a number of cases:

a) if local capital stock is not constant along time (Dekle, 2002);

b) when productivity shocks induce a negative impact on employment growth because demand elasticity is low and production does not expand enough simultaneously (Combes and Overman, 2003);

c) whenever the sources of externalities and agglomeration influence labour supply (Dekle, 2002 and Cingano and Schivardi, 2003);

d) if capital and labour have a high degree of substitutability and technological change is labour saving.

As a matter of fact recent empirical studies (Dekle, 2002 and Cingano and Schivardi, 2003) have cast serious doubts on the idea that changes in productivity reflects proportional variations in employment. In particular such studies, by using TFP measures for productivity growth, show that specialisation may prove positively linked to economic performance whilst diversity is not[8]. Similar results are found by De Lucio *et al.* (2002), who report no effect of diversity on labour productivity growth and an interesting U-shaped curve for specialisation effects. Finally, Hendeson (2003), through the estimation of plant level production functions in a

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[7] As a matter of fact, this was also the case in Glaeser *et al.*'s paper. But in this case the specialization coefficient is already negative and the elimination of the bias would just possibly reinforce that result.

[8] Most importantly, Cingano and Schivardi (2003) show that within the same sample, if one uses employment growth as the dependent variable the specialization externalities became negative.

panel context, finds that localization/MAR scale externalities have strong productivity effects in high-tech but not in machinery industries. Again he finds no evidence of urbanization economies from the diversity of local economic activity outside the own industry and limited evidence of urbanization economies from the overall scale of local economic activity. He also studies the spatial extent of externalities and finds that they are quite localized within the own county, so that there are not external benefits from plants in other counties in the MSA. Similarly, Cingano and Schivardi (2003) find that there is no effect on TFP played by neighbourhood specialisation calculated at a higher level of territorial aggregation.

The use of TFP measures is an obvious notable improvement by these studies, which, however, have to accept some backdrops with respect to other measurement issues. In particular, Dekle (2002) and De Lucio *et al.* (2002) have to move from the city or the local labour system level typical of these studies to a more aggregated level, that of administrative regions, where labour market and good markets do not necessarily coincide. On the contrary, Henderson (2003) and Cingano and Schivardi (2003) are able to keep a disaggregated level of analysis, that of metropolitan areas and counties in the former and that of local labour systems in the latter. The acknowledged problem being that they rely on samples of plant data which bring about some problems of selection bias.

Another interesting issue raised in the literature is whether the role of externalities varies with respect to some concurrent economic phenomena. Glaeser *et al.* (1992), for instance, suggested that there might be an industry life cycle in which externalities are only important in the early development stages. Similarly, Krugman (1991, p. 62) indicated that as an industry develops, it might become less dependent on pooled labor, specialized inputs, and knowledge spillovers. Moreover, externalities that foster the initial development of a location might not be the same that affect its subsequent growth (Duranton and Puga, 2002). In other words, the nature of externalities is not independent from product cycle:

experimental activity is initially found in large diverse urban areas (Jacobs externalities); but traditional production, which is more standardized, can be easily decentralized in small and specialized urban areas with lower costs (Marshall externalities). This line of interpretation has been used both by Combes (2000) and Usai and Paci (2003) to make sense of some differences in results among sectors in the former case and among regions in the latter case.

Most importantly for the present purposes of this paper, the role of externalities may be very different across industries and most of all between the two macrosectors: manufacturing and service. The reason is, as argued by Krugman and Venables (1995)[9], that goods which are essentially non-tradable (such as most services) have to be produced close to customers, leading activities to remain spread out. On the contrary, tradable goods, such as manufacturing, can enjoy agglomeration economies by locating where it is more convenient and therefore be more concentrated in space.

This view, according to Desmet and Fafchamps (2003), may have interesting dynamic implications. As transport costs fall, goods became tradable, allowing production to take advantage of agglomeration economies by concentrating. However, if transport costs continue to drop, those agglomeration economies may go beyond a threshold where activities start spreading back out to less congested areas. Consequently, if this interpretation is correct, the service sectors, which have a non tradable nature, should be more spread out, but, with transport costs falling, they should be currently concentrating in space. On the contrary manufacturing goods are eminently tradable and they have been for a long time. As a result of decreasing transport costs therefore they should become less concentrated.

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[9] See also Baldwin and Martin (2003) about the effects of tradability, transaction costs and capital mobility on the growth dynamics within a centre-periphery model.

Finally, the dynamics of the service sectors is linked to the evolution of the economy and in particular of the manufacturing compound. One can distinguish two possible effects linking the dynamics of the two macrosectors. On the one hand, service firms may substitute manufacturing firms as the latter rely more and more on the market, due for instance, to decreasing transaction costs. There is, therefore, an inverse relationship. On the other hand, at the same time, as long as the two macrosectors are complementary, especially because the manufacturing sector is a buyer of service sectors, the two dynamics may be positively related. However, one should bear in mind that service sectors are extremely heterogenous: for example business services may follow an altogether different dynamics and localisation process from family services.

On the one hand, business services are, on average, locally concentrated near the firms to which they sell their products. This is usually explained by referring to intangible aspects of localised knowledge which need day by day and face to face contacts to facilitate exchanges of essential information. On the other hand, family services are usually more spread out. As regards their dynamics, however, we may also find important differences according to other characteristics. For example, some services may prove to have some inferior goods characteristics: For example, transport services are substituted by durable goods, such as private cars, and their diffusion decreases with income, as a result. Conversely, some other services have a luxury goods nature, such as culture and tourism, and their general consumption increases with income.

The complexity of the nature of these two macrosectors and of their relationship is bound to be reflected in our results.

3. The data and the descriptive analysis

Our empirical analysis makes use of a very ample database on socio-economic indicators for the Italian Local Labour Systems (LLS). LLS are 784 groupings of municipalities identified by

ISTAT by means of commuting data from the population census: the geography of where people live coincides with the geography of where people work, that is local good market and local labour market (Sforzi, 1997). This high level of geographical breakdown appears particularly fruitful for the analysis of local growth since the production activities have, by construction, a high degree of self containment that makes it easier the identification of the explanatory factors at the local level.

The information on local labour systems is also disaggregated with respect to 34 sectors at the 2 digit ATECO 91-ISIC 3 level. In particular we distinguish between 21 manufacturing sectors (including building) and 13 service sectors (excluding the public sector for which data is available only for 1991).

The data, which consists mainly of units of labour and number of firms and plants, refers to the five-year period from 1991 to 1996. The choice to refer to such a short period, which is obviously bound to limit our result, is due to the fact that we preferred to use territorial units unvaried along time. To extend backwards (to 1981) the definition of LLS based on 1991 information would have meant to ignore the fact that in 1981 LLS in Italy were differently shaped and amounted to 944.

The employment dynamics at the aggregate level in Italy during the nineties shows a loss of 287.000 units of labour with an average annual fall of 0.43%. This aggregate trend hides a highly differentiated pattern at the sectoral level. In particular, the manufacturing sector has reported an average employment fall of 1.47% per year, while the service sector has increased by 0.17% per year. The employment growth in the service sector is strictly related to a process of structural change and outsourcing, common to all advanced economies. As pointed out by the literature, from the eighties to nowadays a large number of manufacturing firms, in order to improve their productivity in the core business, has moved some auxiliary internal activities to external service firms. This is the case of several activities related to cleaning, accounting, engineering, marketing, security, etc.

However, the most striking feature of this general employment decline has been its considerable variety in terms of spatial distribution. Employment dynamics follow the usual North-South pattern, although some important qualifications emerge from the data especially among Northern regions. As a matter of fact, if one distinguishes six macro-areas and two macro-sectors (manufacturing and services) there appear some interesting facts. (see Maps 1-3 and Table 1).

Considering the entire productive activity, we can see from Table 1 that the North-East is the only employment-growing area, the Centre-North, compared to the other areas, reports just a minor fall, whereas the South and the Islands have the worst negative performance. It is therefore worth remarking that there is a dualism within the North itself: the North-East shows a good performance with a growth of 0.33% per year, whilst the North-West stays below the national average due to a fall of 0.48% per year. The growth of the North-East can be mostly credited to the localisation in that area of growing service sectors, such as real estates, computer activities and the tourist activities (hotels and restaurants). The one of the North-East is a recent story of industrial and service development based on local networks of small and medium dynamic firms and plants scattered throughout the area. This is the widely studied development model of the "industrial districts" (see, among many others, Brusco, 1982; Piore and Sabel, 1984). The regions of the Centre-North have a similar performance suggesting that the Italian model of small and medium enterprises agglomeration systems, typical of these two areas, have been rather successful in going through such a troublesome period. Whereas the one of the North-West is very much the development history of the Italian industrial system of large heavy industries with Turin, Milan and Genoa as main metropolitan centres, giving rise to the so-called "industrial triangle". The services growth in this area has not been able to compensate the deep industrial crisis. At the other extreme, the South and the Islands show the worst performance with a loss of, respectively, 0.8% and 1.7% of employees per year during the

period 1991-96. The crisis of the industrial sector in this area may be interpreted as the result of the path followed so far by such regions. The government policies performed in the past forced the localisation of large firms in the capital intensive industries (chemicals, oil, steel) while inducing the crowding out of the weak domestic network of firms. The structural crisis of such heavy industries and the slow process of recovery and growth of a renewed structure of endogenous firms, together with the lack of infrastructures, are behind such negative records.

As for manufacturing sector, the North-East is more similar to Centre-North (as a result of the presence of small dynamic firms in the industrial districts) than to North-West (still characterised by the presence of large heavy industries) while the Islands and the South have the worst performance. The service sector shows in the whole country a positive performance even though there are differentiated patterns across the macro-regions. The best positive results are in the North-West, followed by North-East and Centre-North. In the three remaining macro-regions the evolution is negative, with the Islands showing again the worst performance.

Let now consider the performance of individual Local Labour System (see Table 2). Very often, successes and disasters are the result of idiosyncratic shocks affecting certain sectors which are (or become) prevalent in certain regions. Most best performing LLS are in the North (especially in Trentino) but for the renowned case of Melfi, associated to Fiat. The multinational car maker played the role of the so called "large developer" by building a plant for the production of vehicles, thanks to the financial and fiscal incentives available to the Objective 1 regions of the EU. Most worst performing LLS are in the South (especially in Calabria and Basilicata).

In Table 3 we turn our attention to the employment dynamics across the 34 sectors we are considering. There is as much variability from sector to sector as from one area to another one. The best performing sectors are among services, above all Real estate activities (14% annual average growth rate) and the

Professional and entrepreneurial services (5%). Some services have, nevertheless a negative dynamics: Motor vehicles trade, Retail (which is the most important sector in terms of quota of employees), Post and telecommunication and Renting of machinery and personal goods). The worst performing sectors are among manufacturing, primarily Other transport equipment (-6%), Radio, television and communication equipment (-5.9%) and Basic Metals (4.5%). Only few manufacturing sectors have shown a positive performance: Rubber and plastic (+2%), Instruments (+2%) and Machinery (+0.6%).

Finally, as for the problem of spatial dependence, there are contrasting outcomes (see Table 4). At the global and macro-sectors level we find evidence of spatial autocorrelation, already detected from the visual inspection of the previous maps. The Moran index for the whole country and for the manufacturing and services sectors indicates that the dynamics of employment in a local labour system is influenced by the performance of nearby areas. Moreover, spatial dependence is present in the Construction industry. At the same time, when employment growth is disaggregated by sectors, the occurrence of spatial dependence is more differentiated. As a matter of fact, in only 14 sectors out of 34 there appears positive and significant spatial dependence.[10] In general, spatial association is more frequent in services (8/13 service sectors show spatial dependence) rather than in manufacturing (6/20).

4. The estimation framework

The estimated reduced form is based on the idea that employment dynamics can be affected by three families of

[10] The unexpected presence of negative and significant spatial dependence in *Furniture and recycling* may be interpreted as a purely statistical result due to the fact that this is the "residual" sector in the classification of manufacturing activities and therefore it is highly heterogeneous.

potential externalities differentiated with respect to their level of idiosyncraticity. In other words, we differentiate between externalities which are specific for a certain local industry, those which are characteristic at the local level and those which are specific for a certain industry.

We, therefore, agree with recent literature (Dekle, 2002; Cingano and Schivardi, 2003) that employment growth regressions are able to provide interesting information on the reduced form relation between local conditions and employment but not, on a clear-cut basis, on productivity growth. We have seen that this is because of four possible problems concerning the constancy of local capital stock, the demand elasticity, the effects of agglomeration on labour supply and the degree of substitutability among factors. We believe that in our sample only the first hypothesis may be thought of as realistic whilst it appears clear that local externalities affect labour supply and therefore create identification problems. Moreover the combination of events of high demand elasticity and low factor substitutability appears rather unlikely in Italy in the early nineties, a period characterised, on the one hand, by diffused reorganisation and restructuring at several levels of the production chain and, on the other hand, by stagnating demand.

We therefore decompose factors affecting employment dynamics at the local industrial level into three major groups: (1) local industry level, (2) local level, (3) industry level. Let us discuss the various phenomena which are going to be considered as potential determinants of the performance of local industrial employment.

(1) Local industry level

At the local industry level one finds the most debated factors, that is specialisation or Marshall externalities (*SE),* diversity or Jacobs externalities *(DE)* and scale effects and/or the degree of competition (*SC*).

In general, the specialisation or Marshallian externalities capture the advantages gained by firms producing similar products

within a bounded geographical location. Marshall externalities are measured by means of an index of relative production specialisation. This variable measures static pecuniary and localisation externalities such as the availability of suitable supplies of labour force, primary and intermediate goods (Ellison and Glaeser, 1999), the provision of specific goods and services (Bartelsman *et al.,* 1994) and the availability of specific infrastructures and networks. Moreover, this specialization index should also take into account dynamic spillovers coming from the intra-industry flows of localised knowledge which occurs among similar firms located in the same area (Henderson *et al.*, 1995).

Marshall externalities are usually contrasted with diversity externalities in the production activities (also known in the literature as Jacobs or urbanisation externalities; Jacobs, 1969). In this work they are measured by the inverse of the Herfindal index applied to employment in all sectors except the one considered. Such externalities are expected to positively influence local growth under the hypothesis that a firm located in a certain area can benefit from the presence in the same area of a wide range of other firms operating in different sectors since it can enjoy fruitful inter-industries exchanges and cross fertilisation.

Finally, among local and sector specific variables, an index of competition or of scale economies is usually included to assess the so called Porter effect (Porter, 1990). Such an index is the average dimension of plants which, in fact, has been included in previous studies to consider two distinct effects:

- the number of firms per worker (the inverse of *SC*), is interpreted by Glaeser *et al.* (1992) as a direct measure of the degree of local competition.
- the number of employees per firm can be seen as a proxy for economies of scale which may affect labour productivity (O' hUallachàin and Satterthwaite, 1992).

In principle, it would be better to distinguish between the two effects defining two different indicators and including both of them in the estimated equation (as it is done in Combes, 2000b).

Unfortunately, the lack of data on employment of individual firms does not allow the construction of a concentration ratio as a more appropriate indicator of local competition. Unlike previous contribution we do not attribute a priori any of the two effects to such indicator, leaving its interpretation uncertain.

(2) Local level

Employment changes at the local industrial level may be due to some features which characterise the whole local labour system. Local factors may refer to a large set of socio-economic phenomena which influence firms performance in the area. We have classified them as follows: network externalities (*NE*), human capital (*HK*), social capital (*SK*) and labour supply (*LS*).

The first class of network externalities (*NE1*) are intended to take into account the influence of the size of the economic system, measured by the population density (resident population in each LLS per Km^2), where a firm is located (Ciccone and Hall, 1996). In practice one expects a positive effect on local growth when a larger population density implies a higher local demand and the availability of a wider supply of local public services. The closeness of buyers may have both a static and a dynamic effect, the latter being related to the fact that this may facilitate early perception of market needs. At the same time the increasing size of the local economy may imply diseconomies of scale setting in when congestion effects prevail giving rise to pollution and higher competition on the factor markets meaning higher factors costs.

We have also included a second proxy for network externalities (*NE2*) which focuses on the supply side taking into account the presence of small firms within the local economy. The idea is that a larger share of small plants may induce firms to find externally their optimal production scale through cooperation and integration with other firms at the local level. This stimulates the creation of local externalities. The opposite happens with large firms which are more vertically integrated and therefore are less involved in local networks.

The role of human capital (*HK*) in facilitating innovation activities and information spillovers and therefore growth is examined by means of a proxy to measure the availability in the local area of labour forces with a high levels of education (share of population with a university education).[11] A higher availability of well educated labour forces represents an advantage for the localization of firms thus fostering local growth.

Another important local element which may encourage innovation activities and smooth the process of knowledge diffusion is social capital (*SK*). In this case it is not an easy task to find the proper indicators for such a complex and intangible phenomenon (Helliwell and Putnam, 1995). To measure the degree of trust in the local society we include an index of the propensity to cooperate among firms based on the number of inter-firms agreement and participations in consortia surveyed by the industrial census at the provincial level. The idea is that a higher propensity to cooperate among firms in a certain area helps local growth since it facilitates knowledge diffusion, decreases transaction costs enabling firms to take advantage of local externalities.[12]

Finally, we accept the idea of Cingano and Schivardi (2003) that externalities may affect the labour supply (*LS*) and therefore we include this potential effect directly by inserting an indicator of its magnitude. Such an indicator is given by the participation rate (labour forces over population age 15-65).

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[11] We have also tried another proxy: the share of population with just the primary education which measures low level of education and therefore should affect negatively local growth.

[12] We have also tested a second indicator to capture the characteristics of the social environment: an index of the existence of organised crime at the provincial level, under the hypothesis that a high level of crime is detrimental for local development since it increases firms' costs and reduces expected revenues.

Other potential local externalities may be those related to natural endowments and other geographical factors. They should however have more a static rather than a dynamic effect. We have nevertheless tried to take these into account by means of local fixed effects, in the panel regression. However, they prove to have too a strong collinearity with the other local indicators and have been therefore removed in the basic regressions reported in the next section.

(3) Industry level

The growth rate of employment in a local industry may also be affected by factors which are idiosyncratic to each production sector while they are common to all areas. These factors can capture, for instance, the technological progress and opportunities within each industry at the national level. In our econometric estimation they are proxied by the sectoral fixed effects in the panel regressions.

5. The econometric results

The econometric analysis is based on a simple where labour dynamics at the local industry is assumed to depend on the three families of determinants described in the previous section:

$$log(L_{ijt+1} / L_{ijt}) = \chi_1 SE_{ijt} + \chi_2 SC_{ijt} + \chi_3 DE_{ijt} + \beta_1 NE1_{it} + \beta_2 NE2_{it} + \\ + \beta_3 HK_{it} + \beta_4 SK_{it} + \beta_5 LS_{it} + FE_j$$

5.1 Econometric strategy

In this work we attempt to simultaneously consider different factors which are bound to affect local economic growth expressed by employment dynamics. Actually, in the search of the best specification we do not apply the usual general to specific approach which consists of a sequence of deletions of variables which are found not significant from a statistical point of view. On the contrary, we carry out an analysis of parameter stability with respect to different subsections of our main sample. In other

words we apply the same general specification to sub-samples identified with respect to geographical and sectoral features to establish if there is any difference in the value, sign and significance of the estimated coefficients.

The main differences with respect to our previous work on Italy (Usai and Paci, 2003) are that the present paper: (i) includes the entire market economy (manufacture plus services); (ii) sectors are considered at a higher level of aggregation (2-digit instead of 3-digit) in order to increase the probability of finding non-zero observations in the local industry.

Indeed, one of the crucial point in the analysis of highly specialised sectors in small areas is that often we deal with too small a number of firms (or even null) making the econometric analysis more problematical. Therefore, in order to test the robustness of our findings, we try to control for the potential causes of selection biases. More specifically, in some estimations we have excluded: (i) all local industry observations with a zero number of firms both in the initial and final year, (ii) the outlier observations with a residual higher than 3 times the standard deviation.

To take into account the risk of variables omission with respect to the industry dimension we include sectoral fixed effects. We have also tried to control for local fixed effects but they turn out to generate problems of multicollinearity given the simultaneous presence of several explanatory variables specific to each area. It is important to remark that all our regressors are exogenous to the local industry employment growth rate since they refer to the beginning of the period considered. All variables are in log and normalised by the value they take at the national level.

5.2 Aggregate regressions

Let start with the analysis of aggregate estimations based on dataset with two-dimensions: the geographical and the sectoral ones. Five different panels have been defined: Italy with 784 LLS and 34 sectors; North-Center (453 LLS, 34 sectors); South (331

LLS, 34 sectors); Manufacture (784 LLS, 20 sectors); Service (784 LLS, 13 sectors). The estimation results are reported in Table 5.[13]

The first interesting, but no longer unexpected, result is the absence of specialisation externalities: the coefficient of *SE* is negative and highly significant in all the subsets under consideration (North, South, Manufacturing and Services). This outcome confirms previous studies for the United States (Glaeser *et al.*, 1992), France (Combes, 2000b) and Italy (Forni and Paba, 2002; Cainelli *et al.*, 1999; Usai and Paci, 2003). The absence of Marshallian externalities at the LLS level can be partly explained by the fact that our analysis covers a short time period characterised by a severe economic crises which may have induced stronger reorganization processes in those local productive systems which were highly specialized and therefore more costly to be modified and transformed. Moreover, we may also note that most highly specialised local production systems in Italy operate in traditional and mature sectors and that the negative relationship between initial specialisation and employment growth can also be linked to a product cycle mechanism.

As for the average firm size (*SC*), this is always found negatively related to local growth suggesting the absence of economies of scale in the employment growth mechanisms. This result is strengthened by the positive sign of network externalities attached to the small firms indicator (*NE2*). Diversity externalities (*DE*) appear positively related to local growth for the whole economy, while, once we split the sample by areas and sectors, it maintains the positive influence only for manufacturing.

As far as local specific determinants are concerned, the size of the local system, measured by population density (*NE1*), shows

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[13] In the panel estimations it is not feasible to deal with the problem of spatial association due to technical storage limits imposed by Spacestat for such large datasets. Spatial association is dealt with in the sectoral estimations where we find that most results are, nevertheless, robust with respect to the presence of spatial autocorrelation.

contrasting results. It appears negatively linked to employment dynamics in the North and in Manufacturing, but it turns out to be positive in the South and for the service sector. In other words, this result signals that in the Centre-North (where most of the manufacturing activities are located) some congestion effects are already at work, while a positive agglomeration effect is still present in the southern regions.

The indicators referring to different qualities of capital (human and social) show interesting composite results. First, university education (*HK*) emerges as relevant and positive determinant of local growth (as in Lodde, 2000 and Di Liberto, 2001). However, this relationship proves more complex when one moves to a more detailed sectoral analysis. Indeed, university education influences negatively employment growth in Manufacturing, whilst its positive effect is confirmed in the service sector. Secondly, the importance of social capital (*SK*), that is cooperation among firms, positive, as expected, in all regressions except for the South and Manufacturing. Finally the presence of a large labor supply (*LS*, proxied by the participation rate) exerts a positive influence on employment dynamics.

All these results reinforce the idea that - especially in a period of negative business cycle like the one considered - a production system based on a diversified network of small flexible firms, willing to cooperate and characterized by well educated labor forces is a crucial asset to promote local employment growth.

5.3 Sectoral regressions

In this section we turn the attention to the analysis of employment growth in each sector based on cross-section estimations. In this case we are also able to face directly the problem of spatial association. As we have remarked before, the employment growth in a region may be influenced by employment dynamics in the nearby areas introducing a possible bias in regressions which do not take into account this possibility. In order to deal with this problem we have applied the following estimation procedures:

i. OLS estimation with SpaceStat to assess the presence of spatial autocorrelation based on the LM tests;
ii. if autocorrelation is not detected, the LS estimates are efficient and consistent; we have used the OLS White robust standard errors estimation which allows us to correct for the heteroschedasticity;
iii. if spatial autocorrelation is detected, we try to rectify the estimation procedure by including a spatial lag dependent variable. In such a case it is necessary to use Maximum Likelihood estimation instead of OLS, introducing spatial lag dependent variables up the contiguity level necessary to correct for the presence of spatial autocorrelation.

The results of sectoral regressions are reported in Table 6. In 10 out of 34 sectors we have detected spatial autocorrelation and therefore a ML estimation has been performed with the inclusion of first and second order contiguity spatial lag dependent variable. They have proved always positive and significant. Thanks to this procedure spatial autocorrelation has been controlled for in all sectors. The sectoral results show that the impact of local characteristics differs significantly in manufacturing and service sectors.

Some remarks can be emphasized. As regards specialisation externalities, the coefficients appear mostly negative and statistically significant both for service and manufacturing. There is only one case where specialisation is enhancing employment in this period, that is the tourism sector. This sector is a growing industry across Italy and especially in the North-East where there prove to be strong agglomeration and specialisation externalities, also in contiguous areas. One other noticeable result concerns the magnitude of such negative effects which appear larger for service sectors. This may induce convergence of the employment composition across regions (see on this point Rombaldoni and Zazzaro, 1997). At the same time this result seems to contradict evidence for the United States where service sectors seem to be getting more concentrated along time thank to decreasing transport costs (Desmet and Fafchamps, 2003). Harder

evidence, possibly on a longer time span, is nevertheless requested to ensure this is not just a temporary occurrence related to the period under examination.

Diversity externalities play a positive and significant influence on employment dynamics in less than half of our sectors. More exactly in 15 sectors, 10 in manufacture and 5 in services. There are also four sectors for which diversity plays a negative role (Leather and footwear and Petroleum products among manufacturing and Transport services and Renting of machinery and personal goods among services). As for this indicators we believe that more evidence should be collected in order to disentangle those effects which are truly cross-fertilisation spillovers (and therefore more dynamic in nature) and those which are due to input-output relationships (and therefore with more static consequences)[14].

As regards the indicators which might measure at the same time scale internal economies and competition effects, as expected, we record a high variability across sectors. A positive sign is found mostly in the manufacturing sectors (basic metals, printing, petroleum, rubber etc) signalling, most probably, given the characteristics of these industries, economies of scale at work rather than counter-effects of competition. Interestingly, a positive role is found also for some service sector, notably in retail trade where a process of strong concentration has been going on in the last decade. The other service sector which displays a positive sign is R&D. Furthermore, it is worth noting that for four service sectors (motor vehicles trade and repairs, hotel and restaurant, real estate activities and other business services) either diseconomies of scale are affecting employment growth or most likely local competition effect are at work. Finally, also for construction the coefficient proves negative and significant.

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[14] See the interesting methodology developed by Forni and Paba (2002) on this aspect.

As for the other determinants we may notice that human capital, that is the availability of employees with a university degree, turns out to be important especially in the services sectors. Similar results are reported for social capital, the effect of which is mostly positive and significant mainly in the service sectors. As for the size of the economy results are ambiguous. In five sectors (3 among manufacturing and 2 among service) there are positive and significant effects, whilst in other 3 (2 in manufacturing and 1 in service) the effect is negative. As regards the indicator concerning labour supply this prove to be mostly positive especially in the service sectors.

6. Concluding comments

This paper tries to put the issue of local economic performance within a broad scenario where an ongoing process of structural change transforms the economies from manufacturing to service ones. It is argued that such a process has insightful implications for the analysis of the geography of economic activities as far as they are different with respect to several forces of agglomeration which can be at work. The main contribution of this paper is, therefore, the analysis of local short-run economic performance, as expressed by employment dynamics, both in the service and in the manufacturing sectors. Thanks to a large set of variables and data we attempt to explain some of the differences in the economic performance of sectors by assessing the role of several potential determinants of local economic dynamics.

Results confirm the existence of a multifaceted picture when it comes to agglomeration forces operating at very small geographical units. Overall we find that specialisation has negative effects possibly due to the specific critical period we are analysing but also to a process of restructuring which substitute labour with other factors.

As for the average firm size, this is always found negatively related to local growth suggesting the absence of economies of scale in the employment growth mechanisms (or the existence of

pro-competitive effects). This result is strengthened by the positive sign of the variable which indicates the presence of small firms in the local area. Finally, as in previous work, diversity externalities appear positively related to local growth for the whole economy, and it maintains the positive influence for manufacturing but it loses significance for services. Human and social capital stocks prove to be important for employment growth, too. All these results corroborate the idea that - especially in a period of negative business cycle like the one considered - a production system based on a diversified network of small flexible firms, willing to cooperate and characterized by well educated labor forces is a crucial asset to promote local employment growth.

As for the sectoral regressions, the picture becomes even more intricate but for the role of specialisation, which appears always negatively linked to employment dynamics with the only remarkable exception of the tourist sector. It is also important to note that spatial correlation among employment growth rates in contiguous areas is taken into account, when neeeded.

Some interesting extensions lay ahead. First of all, we argued that some of the results may well depend on the economic downturn the economy was experiencing during the period under study. In this light, it is important that the new data from the Italian Census will be available soon for such a crucial investigation for the period 1991-2001. Such data is also important in order to explore the possibility to convert employment data into value added data, by exploiting also newly available data at the plant level and at the provincial level, in order to make possible the analysis of the real economic performance measured by productivity. Secondly, it may be interesting to replicate Desmet and Fafchamps (2003) regressions of employment growth rates on lagged levels of employment itself to see which sectors are becoming more concentrated (showing some sort of divergence) and which are not (implying some sort of convergence).

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Appendix. Table A.1 Variables description and sources

Variables	Index	Level of aggregation		Sources
		area *	industry	
Dependent variable				
- *Local industry growth*	annual average growth rate of employment (S)	LLS	2-digit ateco91	1991 - 1996 Industrial Census
1. Local and industry specific variables				
- *Specialisation externalities*	index of employment relative specialisation (S)	LLS	2-digit ateco91	1991 Industrial Census
- *Scale effects competition*	- number of employees over number of plants (S)	LLS	2-digit ateco91	1991 Industrial Census
- *Diversity externalities*	inverse of Herfindal index for employment (S)	LLS	2-digit ateco91-	1991 Industrial Census
2. Local specific variables				
- *Network externalities*				
Population density	resident population (100000) / Km²	LLS	-	1991 Population Census
Small firms	quota of workers in firms with less than 50 employees (S)	LLS	-	1991 Industrial Census
- *Human capital*	population with university education / pop > 24 (S)	LLS	-	1991 Population Census
- *Social capital*	quota of firms with inter-firms agreements (S)	province	-	Industrial Census Long Form
- *Labour supply*	labour forces over population age 15-65 (S)	LLS	-	1991 Population Census

(S) means that the indicator has been standardised to the national value

* Local Labour System=784; Province= 92.

Table 1. Employment growth in macro regions

	Employees (000)		Annual average % variation		
	1991	**1996**	**total**	**manufacturing***	**services**
North West	4658	4546	-0.48	-1.75	0.89
North East	3209	3263	0.33	-0.69	0.65
Center North	1606	1587	-0.24	-1.04	0.33
Center South	1373	1344	-0.42	-1.89	-0.19
South	1528	1445	-1.12	-2.24	-0.83
Islands	894	810	-1.98	-3.14	-1.73
Italy	13431	13144	-0.43	-1.47	0.17

*without construction sector

- *North-West* (Lombardia, Piemonte, Val d'Aosta, Liguria)
- *North-East* (Trentino, Friuli, Veneto, Emilia)
- *Center-North* (Toscana, Umbria, Marche)
- *Center-South* (Lazio, Abruzzo, Molise)
- *South* (Campania, Puglia, Basilicata, Calabria)
- *Islands* (Sicilia, Sardegna).

Table 2. Employment growth in selected areas

Local Labour System	Region	Employees (000)		Annual average % variation	Best sector	Second best sector
		1991	1996			
A. Top 10 LLS						
MELFI	BASILICATA	6	13.4	16	Metals	Car industry
CANAZEI	TRENTINO A.A.	2.1	3.7	11.1	Furniture et al.	Hotel and restaurants
PINZOLO	TRENTINO A.A.	1.9	3.3	10.4	Rubber and plastic	Wearing apparel
MOENA	TRENTINO A.A.	1	1.5	8.6	Computer services	Paper
BADIA	TRENTINO A.A.	3.3	5	8.6	Chemicals	Electronic equip.
PEIO	TRENTINO A.A.	1.4	2.1	7.9	Non metallic minerals	Property
PREDAZZO	TRENTINO A.A.	1.4	1.9	5.8	Leather and footwear	Electronic equip.
MALE'	TRENTINO A.A.	2	2.6	5.5	Precision equip.	Printing and publishing
AVERSA	CAMPANIA	17.6	22.9	5.3	Metals	R&D
AGORDO	VENETO	6.1	7.9	5.1	Property	Auxiliary transport services
B. Worst 10 LLS					**Worst sector**	**Second worst sector**
SANT'AGATA DI ESARO	CALABRIA	1	0.5	-13.9	Non metallic minerals	Electronic equip.
PESCOPAGANO	BASILICATA	1.2	0.6	-13.3	Rubber and plastic	Textiles
SALANDRA	BASILICATA	0.8	0.4	-12.4	Printing and publishing	Precision equip.
SAMUGHEO	SARDEGNA	1.1	0.6	-11.1	Electronic equip.	Renting of personal goods
SAN GIORGIO LUCANO	BASILICATA	0.8	0.5	-10.5	Auxiliary transport services	Renting of personal goods
PALAGONIA	SICILIA	3	1.8	-10.1	Wearing apparel	Renting of personal goods
MAIERATO	CALABRIA	0.6	0.4	-9.2	Wearing apparel	Rubber and plastic
CANDELA	PUGLIA	0.7	0.4	-9.1	Chemicals	Construction
MONTECALVO IRPINO	CAMPANIA	0.8	0.5	-9.1	Wood	Gas and oil
VERZINO	CALABRIA	0.7	0.4	-9.1	Textiles	Printing and publishing

Table 3. Employment growth in manufacturing and services sectors

	Sectors	Employees (000) 1991	1996	Annual average variation	Share on total employment(1996)
1	Food, beverages and tobacco	474	447	-1.2	3.4
2	Textiles	404	345	-3.1	2.6
3	Wearing apparel	419	346	-3.8	2.6
4	Leather and footwear	244	231	-1.1	1.8
5	Wood products, except furniture	186	170	-1.8	1.3
6	Paper	89	85	-0.7	0.6
7	Printing and publishing	195	175	-2.2	1.3
8	Coke and refined petroleum products	29	24	-3.7	0.2
9	Chemicals and chemical products	237	209	-2.5	1.6
10	Rubber and plastic	179	198	2.0	1.5
11	Non metallic mineral products	276	251	-1.9	1.9
12	Basic metals	170	136	-4.5	1.0
13	Fabricated metal products	615	622	0.2	4.7
14	Machinery	539	554	0.6	4.2
15	Office, computing and electrical machinery	233	224	-0.8	1.7
16	Radio, television and communication equipment	139	103	-5.9	0.8
17	Medical, precision and medical instruments	117	129	2.0	1.0
18	Motor vehiclel, trailers and semitrailers	214	186	-2.8	1.4
19	Other transport equipment	136	101	-6.0	0.8
20	Furniture, recycling and other	315	318	0.2	2.4
	Manufacturing (subtotal)	**5210**	**4856**	**-1.4**	**36.9**
21	Construction	1332	1342	0.1	10.2
22	Motor vehicles trade and repair	491	446	-1.9	3.4
23	Wholesale trade	901	986	1.8	7.5
24	Retail trade	1909	1585	-3.7	12.1
25	Hotel and restaurant	727	727	0.0	5.5
26	Transport services	584	594	0.3	4.5
27	Auxiliary transport and travel agencies	186	200	1.5	1.5
28	Post and telecommunication	348	290	-3.6	2.2
29	Financial intermediation and insurance	569	561	-0.3	4.3
30	Real Estate activities	83	168	14.0	1.3
31	Renting of machinery and personal goods	20	18	-2.2	0.1
32	Computer and related activities	181	203	2.3	1.5
33	Research and development	16	20	4.0	0.1
34	Other professional and entrepreneurial services	874	1152	5.5	8.8
	Services (subtotal)	**6888**	**6947**	**0.2**	**63.1**
	Total	**13431**	**13144**	**-0.4**	100.0

Table 4. Moran test on spatial autocorrelation of employment growth among LLS

Normal approximation. Sectors with significant spatial autocorrelation are shaded.

	Sectors	First order contiguity	
		standardized Z values	probability level
1	Food, beverages and tobacco	3.3	0.0
2	Textiles	-0.1	0.9
3	Wearing apparel	1.7	0.0
4	Leather and footwear	-0.3	0.7
5	Wood products, except furniture	2.7	0.0
6	Paper	2.8	0.0
7	Printing and publishing	-0.6	0.6
8	Coke and refined petroleum products	0.2	0.8
9	Chemicals and chemical products	0.7	0.5
10	Rubber and plastic	0.9	0.0
11	Non metallic mineral products	1.5	0.1
12	Basic metals	-0.7	0.4
23	Fabricated metal products	0.5	0.6
14	Machinery	-0.1	0.8
15	Office, computing and electrical machinery	-0.7	0.4
16	Radio, television and communication equipment	1.0	0.3
17	Medical, precision and medical instruments	-0.3	0.7
18	Motor vehicle, trailers and semi trailers	-0.2	0.8
19	Other transport equipment	1.1	0.3
20	Furniture, recycling and other	-2.8	0.0
	Manufacturing (subtotal)	**3.7**	**0.0**
21	Construction	5.0	0.0
22	Motor vehicles trade and repair	3.0	0.0
23	Wholesale trade	1.8	0.0
24	Retail trade	9.7	0.0
25	Hotel and restaurant	12.4	0.0
26	Transport services	2.1	0.0
27	Auxiliary transport and travel agencies	1.0	0.2
28	Post and telecommunication	0.8	0.4
29	Financial intermediation and insurance	3.7	0.0
30	Real Estate activities	1.9	0.0
31	Renting of machinery and personal goods	-0.8	0.4
32	Computer and related activities	0.1	0.9
33	Research and development	0.1	0.9
34	Other professional and entrepreneurial services	5.6	0.0
	Services (subtotal)	**17.9**	**0.0**
	Total	**11.6**	**0.0**

Table 5. Econometric results

Dependent variable: employment growth in the local industry. annual average 1991-1996 (LG)
Estimation method: GLS (cross section weights) with industry fixed effects; White robust standard error
Level of significance: a=1%. b=5%. c=10%

Variables			Italy (with outliers)	Italy	North-Centre	South	Manufacture	Services
Local and industry specific variables	SE	specialisation externalities	-8.74 [a]	-7.14 [a]	-4.76 [a]	-12.2 [a]	-6.17 [a]	-7.77 [a]
	SC	scale effect - competition	-0.53 [a]	-0.37 [b]	-0.50 [a]	-0.52 [b]	-0.46 [a]	-1.51 [a]
	DE	diversity externalities	0.75 [b]	0.66 [b]	-0.43	0.24	4.62 [a]	0.07
Local specific variables	NE1	population density	-0.08 [b]	-1.88	-5.74 [b]	8.59 [b]	-10.10 [b]	0.74
	NE2	small firms	0.29	0.26	0.72 [a]	0.84 [b]	-0.24	0.38 [c]
	HK	human capital	2.01 [a]	1.40 [a]	0.96 [a]	2.42 [a]	-1.09 [b]	2.80 [a]
	SK	social capital	0.19 [a]	0.15 [a]	0.13 [a]	-0.29	0.17	0.14 [b]
	LS	labour supply	1.11 [a]	1.16 [a]	0.89 [a]	0.20	1.67 [a]	1.16 [a]
		n. observation	23326	22293	12674	9617	11551	9321
		Adj. R^2	0.07	0.09	0.07	0.15	0.04	0.13
		S.E. of regression	32.0	22.0	17.8	24.1	21.8	11.3

Note: we have excluded local industry with zero employees in both 1991 and 1996 and outlier observations with a residual larger than 3 standard deviations.

Table 6. Summary of OLS results for 34 sectors ML: Maximum Likelihood, OLS-W: Ordinary Least Squares-White robust Standard errors

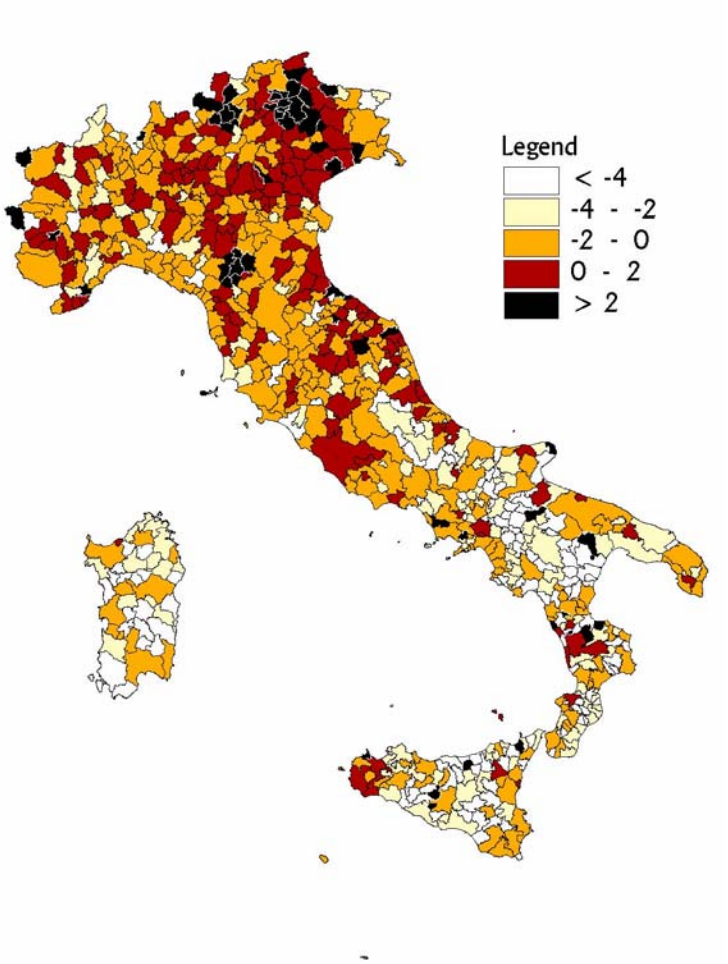
	Sectors	Estimation method	no. obs.	Scale effect-competition	Specialisation externalities	Diversity externalities	Population density	Small firms	Human capital	Social capital	Labour supply	Spatial lag 1st order	Spatial lag 2nd order
1	Food, beverages and tobacco	ML	784	n	**N**	p	n	p	p	p	p	**P**	
2	Textiles	OLS-W	730	n	n	**P**	**P**	p	n	n	p		
3	Wearing apparel	OLS-W	774	p	p	**P**	**P**	p	p	n	p		
4	Leather and footwear	OLS-W	596	**N**	n	**N**	p	p	n	p	p		
5	Wood products, except furniture	OLS-W	784	**P**	n	**P**	**N**	n	n	**P**	**P**		
6	Paper	ML	476	p	**N**	p	n	**N**	n	n	n	**P**	
7	Printing and publishing	OLS-W	729	**P**	**N**	**P**	p	p	**P**	p	n		
8	Coke and refined petroleum products	OLS-W	366	**P**	**N**	**N**	p	p	**P**	p	**P**		
9	Chemicals and chemical products	OLS-W	574	p	**N**	**P**	p	n	p	n	n		
10	Rubber and plastic	OLS-W	619	**P**	**N**	p	n	n	**N**	**P**	p		
11	Non metallic mineral products	OLS-W	779	p	**N**	p	**N**	p	n	p	**P**		
12	Basic metals	OLS-W	454	**P**	**N**	n	n	p	n	p	p		
13	Fabricated metal products	OLS-W	784	n	**N**	**P**	n	n	**N**	n	**P**		
14	Machinery	OLS-W	732	p	**N**	**P**	n	p	n	p	p		
15	Office, computing and electrical machinery	OLS-W	664	n	**N**	**P**	**P**	n	**N**	n	p		
16	Radio, television and communication equipment	OLS-W	668	p	**N**	p	p	n	**P**	p	p		
17	Medical, precision and medical instruments	OLS-W	735	**P**	**N**	**P**	n	n	p	p	n		

Table 6 Continuous

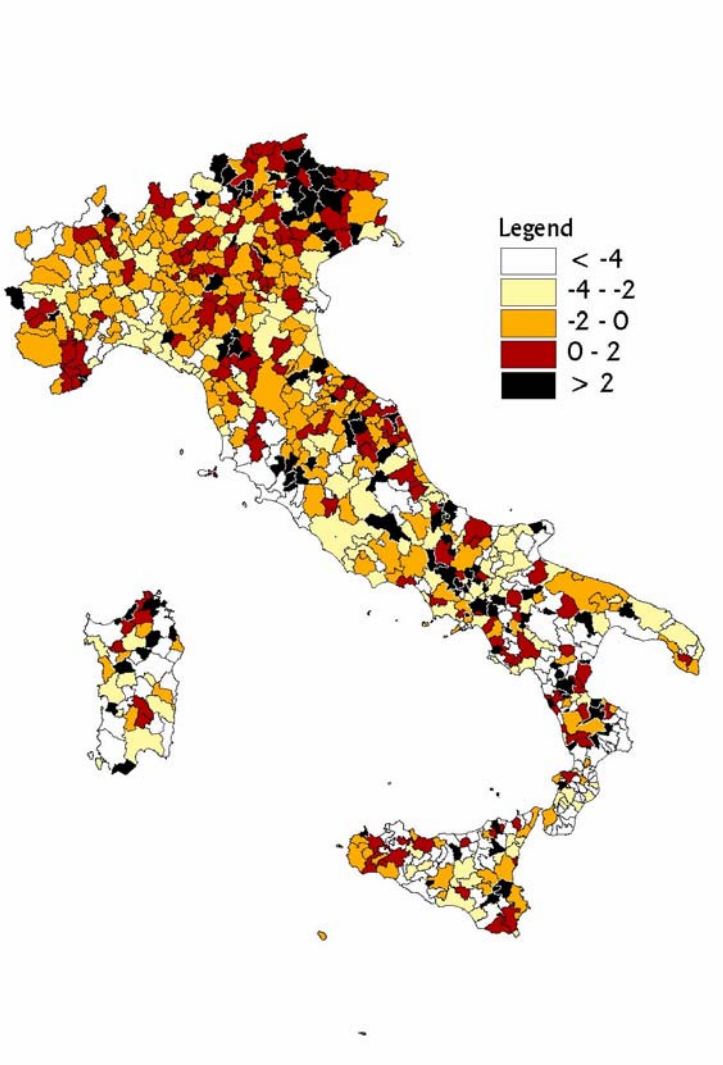
18	Motor vehicles, trailers and semi trailers	OLS-W	370	p	**N**	n	n	p	p	n	n		
19	Other transport equipment	OLS-W	431	p	**N**	n	p	p	p	p	p		
20	Furniture, recycling and other	ML	771	p	**N**	**P**	p	**N**	n	n	p	**P**	
21	Construction	ML	784	**N**	**N**	n	n	**P**	p	p	n	**P**	p
22	Motor vehicles trade and repair	ML	784	**N**	**N**	n	**N**	p	**P**	p	**P**	p	
23	Wholesale trade	ML	784	p	**N**	**P**	**P**	**P**	**P**	n	p	**P**	
24	Retail trade	ML	784	**P**	**N**	p	n	**P**	**P**	n	**P**	**P**	**P**
25	Hotel and restaurant	ML	784	**N**	**P**	**P**	n	n	**P**	p	**P**	**P**	
26	Transport services	OLS-W	784	p	**N**	**N**	p	p	**P**	p	**P**		
27	Auxiliary transport and travel agencies	OLS-W	737	**P**	**N**	p	**P**	p	**P**	n	p		
28	Post and telecommunication	OLS-W	784	n	**N**	p	p	p	p	**P**	p		
29	Financial intermediation and insurance	ML	784	p	**N**	**P**	p	**N**	**P**	p	p	**P**	
30	Real Estate activities	OLS-W	696	**N**	**N**	**P**	n	**N**	**P**	**P**	p		
31	Renting of machinery and personal goods	OLS-W	679	p	**N**	**N**	p	p	**P**	**P**	**P**		
32	Computer and related activities	OLS-W	753	n	**N**	**P**	n	n	**P**	**P**	**P**		
33	Research and development	OLS-W	585	**P**	**N**	n	n	n	**P**	p	**N**		
34	Other professional and entrepreneurial services	ML	784	**N**	**N**	n	p	p	**P**	p	p	**P**	

p = positive coefficient; **P** = positive, statistically (up to 10 %) significant coefficient; n = negative coefficient; **N** = positive, statistically (up to 10 %) significant coefficient.

Map 1. Employment Dynamics in the
Local Labour Systems in Italy (1991-1996)



Map2. Employment dynamics in Manufacturing in the LLS in Italy (1991-1996)



Map 3. Employment dynamics in Services
in the LLS in Italy (1991-1996)