

# Agglomeration economies and growth in the Italian Local Labour Systems.

1991-2001

Raffaele Paci and Stefano Usai

(Crenos and University of Cagliari)

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Economia regionale e dell'innovazione

## OUTLINE

- Background literature
- Motivations and aims
- Database and descriptive statistics
- Spatial analysis
- Estimation framework
- Econometric results

## Literature / 1 “Externalities and local growth”

Analyse how local industrial employment is affected by different types of externalities: (mainly specialisation, diversity and competition)

- Seminal contributions by Glaeser, Kallal, Sheinkman and Sheifler (1992), Henderson, Kunkoro, Turner (1995) for the **United States**

This approach has been replicated in several studies, using different methodology, territorial units, sectoral definition, time period (survey of the literature: Rosenthal – Strange, 2004). Not surprisingly, results are contradictory.

- **France:** Combes (2000), Combes et al (2004)
- **Portugal:** Almedia (2001)
- **Netherlands:** Van de Soest, Gerking and van Oort (2002)
- **Finland:** Mikkala (2004)
- **Italy:**
  - Forni - Paba (2001) (94 provinces - 1971-1991)
  - Cunat - Peri (2001) (784 LLS - 1981-1996)
  - Usai - Paci (2003) (784 LLS, 94 industries, 1991-96, spatial analysis)
  - Pagnini (2003) (95 provinces, 1961-91, spatial analysis)
  - Lafourcade-Mion (2004) (SLL)

## Literature / 2 A compelling critique

Some recent studies (Henderson, 2003, Cingano - Schivardi, 2004; Dekle, 2002) criticise the idea that employment growth may be used as a proxy of productivity changes and suggest the use of TFP measures for productivity growth.

More generally, Combes - Overman (2004) comment: "All of this empirical literature critically lacks defined theoretical background".

However, it is very hard to include in a rigorous theoretical model all elements we believe are crucial in determining local dynamics: spatial association, externalities and spillovers, external environments, human capital, trust, factors mobility, etc.

The risk is that the theoretical model becomes a cage where the complexity of the local-industry dynamics can hardly be confined.

At the same time, "...these estimations have to be viewed as proposing stylised facts and not as validating a given theory." (Combes et al, 2004)

## Literature / 3

The empirical results as to be interpreted relying as a guidance on background models

From the empirical point of view, there is a trade off between:

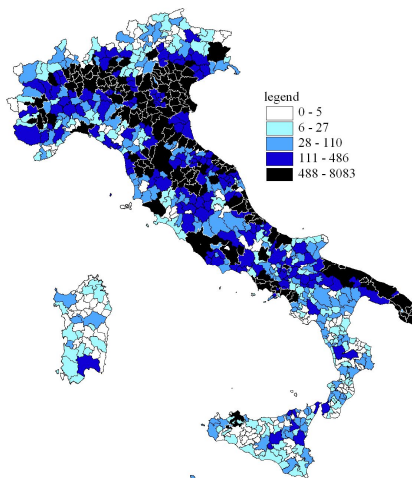
- territorial breakdown ("local systems" vs provinces or regions)
- sectoral breakdown (3-digits vs macro-sectors: manufacturing and services)
- data availability (employment, value added, investment, capital, TFP)

## Motivations and aims

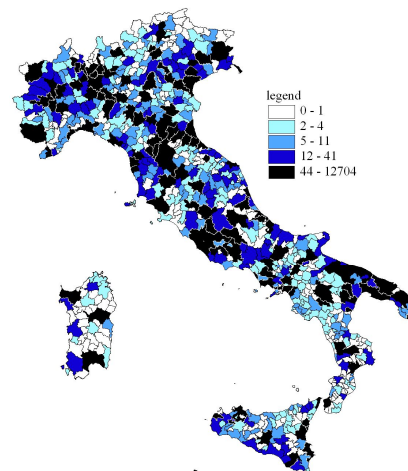
- The main purpose of this empirical paper is to analyse local economic performance, as expressed by employment dynamics, both in the manufacturing sectors and in the market service sectors at a very detailed geographical level: the Local Labour Systems (LLS) in Italy.
- In particular we employ a general classification of the determinants of local growth and then we test, within this general setting, the differences at the territorial and sectoral level.
- Moreover, we use spatial econometric techniques to analyse how the growth processes can diffuse over spatial boundaries (an often neglected issue). Geographical units are not taken necessarily as isolated, closed economies but we emphasize the important role of externalities crossing borders.

## Spatial association (employment 2001)

**Clothing industry** (Moran  $Z=18.1$ )



**R&D sector** (Moran  $Z=0.1$ )



## **The database on Local Labour Systems**

- **Geographical units: 784 Local Labour Systems in Italy**  
grouping of municipalities, covering the whole country, 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.  
“functional regions” rather than “administrative regions”.
- **Sectoral breakdown: 34 sectors**  
2 digit ISIC 3: 21 industrial sectors and 13 service sectors
- **Time period: 10 years 1991 – 2001**
- **Economic data: industrial and population census**  
employees, plants, population, socio-economic measures

## **Descriptive statistics**

Employment dynamics during the nineties has been positive but with some important differences with respect to two dimensions: geographical and industrial

- Table 1 employment growth in macro regions and macro sectors
- Map 1 total employment growth
- Map 2 industry employment growth
- Map 3 service employment growth
- Table 2 employment growth in sectors

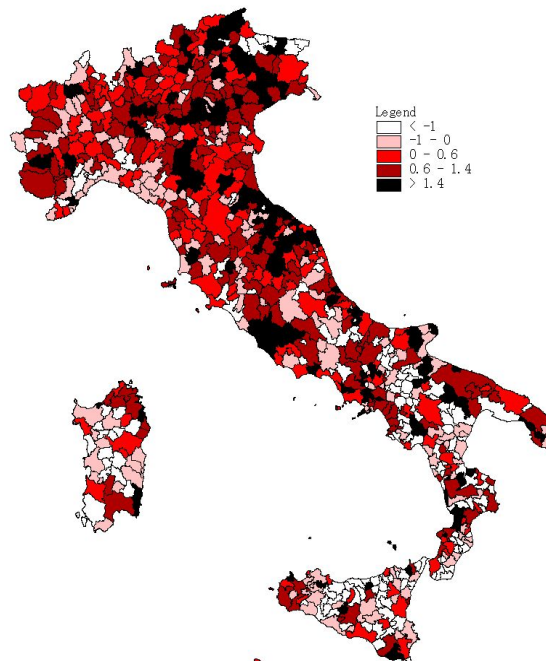
### Employment growth in macro regions and macro sectors

	<i>Annual average % variation</i>		
	<i>Total</i>	<i>Industry</i>	<i>Services</i>
<i>North West</i>	0,52	-0,87	1,91
<i>North East</i>	1,09	0,48	1,73
<i>Center North</i>	0,77	0,12	1,42
<i>Center South</i>	1,08	-0,13	1,71
<i>South</i>	0,67	0,20	0,99
<i>Islands</i>	-0,07	-0,51	0,17
<b>Italy</b>	<b>0,73</b>	<b>-0,19</b>	<b>1,52</b>

Whole economy.

Employment  
dynamics in LLS  
in Italy

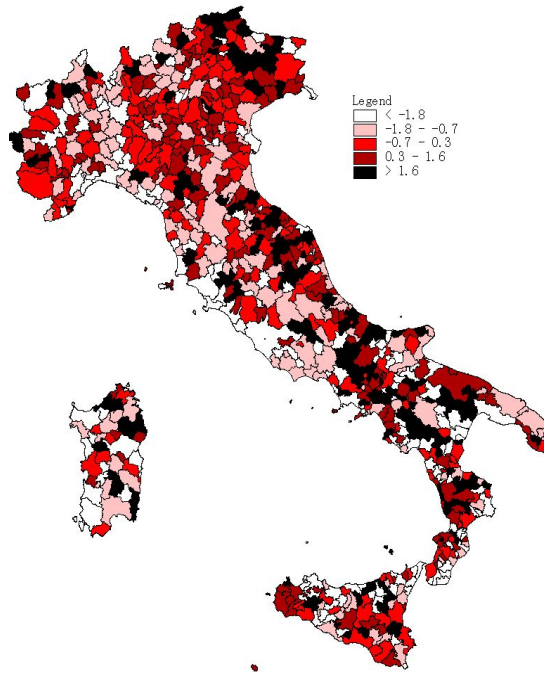
(1991-2001)



**Industry.**

**Employment dynamics in LLS in Italy**

**(1991-2001)**

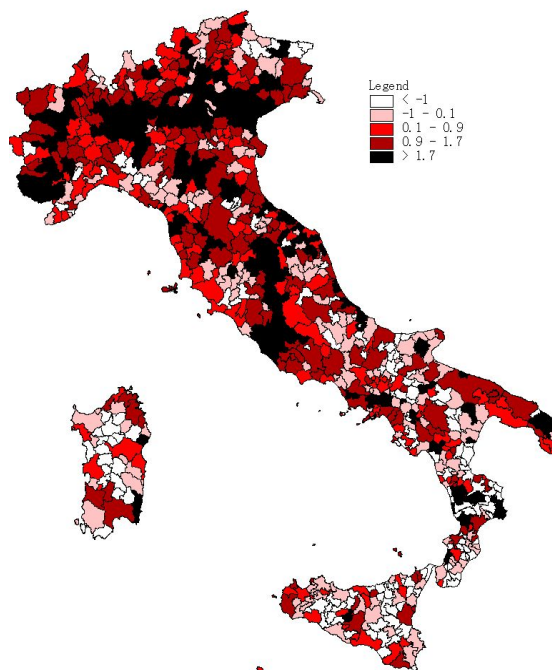


[back](#)

**Service.**

**Employment dynamics in LLS in Italy**

**(1991-2001)**



[back](#)

Table 2  
Employment  
growth in  
sectors

Sectors	Annual average variation	Share on total employment (2001)
01 Food, beverages and tobacco	-0,52	3,11%
02 Textiles	-2,65	2,14%
03 Wearing apparel	-3,41	2,05%
04 Leather and footwear	-1,69	1,42%
05 Wood products, except furniture	-0,38	1,23%
06 Paper	-0,58	0,58%
07 Printing and publishing	-1,13	1,21%
08 Coke and refined petroleum products	-1,48	0,17%
09 Chemicals and chemical products	-1,49	1,42%
10 Rubber and plastic	1,93	1,49%
11 Non metallic mineral products	-0,83	1,75%
12 Basic metals	-2,01	0,96%
13 Fabricated metal products	1,31	4,83%
14 Machinery	1,02	4,13%
15 Office, computing and electrical machinery	-0,09	1,59%
16 Radio, tv, communication equipment	-2,60	0,74%
17 Medical, precision and medical instruments	0,66	0,87%
18 Motor vehicles, trailers and semi trailers	-2,17	1,19%
19 Other transport equipment	-2,88	0,74%
20 Furniture, recycling and other	0,00	2,17%
21 Building	1,38	10,54%
<b>Industry (subtotal)</b>	<b>-0,19</b>	<b>44,33%</b>
22 Motor vehicles trade and repair	-0,70	3,15%
23 Wholesale trade	1,24	7,04%
24 Retail trade	-1,32	11,55%
25 Hotel and restaurant	1,57	5,92%
26 Transport services	-0,10	3,98%
27 Auxiliary transport and travel agencies	5,45	2,25%
28 Post and telecommunication	-1,82	2,00%
29 Financial intermediation and insurance	0,34	4,06%
30 Real Estate activities	10,36	1,61%
31 Renting of machinery and personal goods	4,05	0,21%
32 Computer and related activities	6,74	2,45%
33 Research and development	2,46	0,38%
34 Other professional services	6,04	11,08%
<b>Services (subtotal)</b>	<b>1,53</b>	<b>55,67%</b>
<b>Total</b>	<b>0,73</b>	<b>100,00%</b>

## Spatial analysis

- From the maps there is some evidence of spatial dependence, i.e. the dynamics of employment in a certain LLS is related to the performance of contiguous areas.  
This appears to be true for total employment and for macro-sectors.
- Spatial dependence can be tested directly by means of the global Moran's I statistic which compares the value of a variable at any location with the value of the same variable at surrounding locations. If the mean value of I across all observations is significantly larger than the expected value, then there is positive spatial association.
- In the whole economy, in the macro-sectors (industry and services) and also in 23/34 sectors (14/21 industrial sectors and 9/13 service sectors) we find significant and positive spatial dependence in the employment dynamics.

Table 4.  
Moran Test

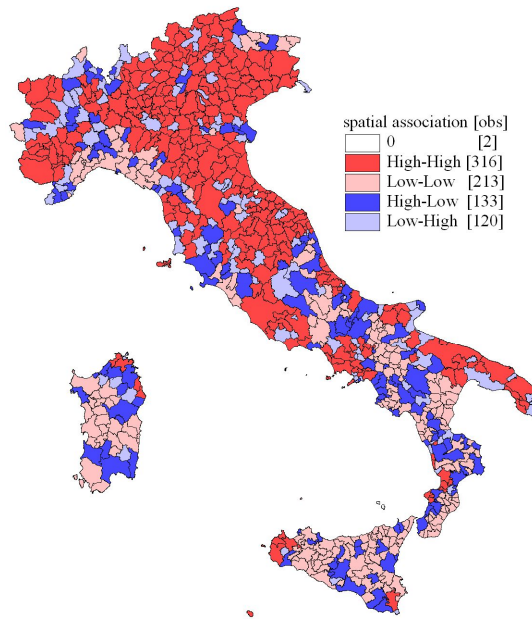
Sectors with significant spatial autocorrelation are not shaded

Sectors	First order spatial contiguity	
	Standardized Z values	Probability level
01 Manufacture of food, and beverages.	3.9	0,0
02 Industry of textile	2.6	0,0
03 Clothing industry	4.0	0,0
04 Industry of leather and shoes	3.1	0,0
05 Working of wood	7.7	0,0
06 Industry of paper and pulp	2.0	0,0
07 Printing, press and publishing	0.8	0.3
08 Gas and oil industry	-1.7	0,0
09 Chemical industry	-0.9	0.3
10 Rubber industry	0.5	0.6
11 Metallurgy, primary processing of non ferrous metals	3.6	0,0
12 Metallurgy of iron and steel	1.4	0,1
13 Industry of metal products	2.7	0,0
14 Manufacture of mechanic equipment	1.3	0,1
15 Manufacture of office machinery and computers	2.3	0,0
16 Manufacture of electronic equipment	1.4	0,1
17 Manufacture of precision equipment	0.8	0.3
18 Automotive industry	-0.3	0.7
19 Other land transport industry	0.3	0.6
20 Industry of furniture, recycling	2.9	0,0
21 Building	12.6	0,0
<b>Industry (subtotal)</b>	<b>7.2</b>	<b>0.0</b>
22 Motor vehicles trade	0.7	0.4
23 Wholesale trade	3.8	0,0
24 Retail trade	7.1	0,0
25 Hotel and restaurant services	9.3	0,0
26 Transport services	3.0	0,0
27 Auxiliary transport and travel agency services	0.3	0.7
28 Telecommunication services	1.8	0,0
29 Financial services, insurance	4.3	0,0
30 Property renting	7.6	0,0
31 Renting of personal goods	-0.0	0.9
32 Computer services	2.1	0,0
33 R&D	0.9	0.3
34 Other professional and entrepreneurial services	7.6	0,0
<b>Services (subtotal)</b>	<b>16.6</b>	<b>0.0</b>
<b>Total</b>	<b>10.9</b>	<b>0.0</b>

LISA (Local Indicator of Spatial Association)

Moran scatterplot

Total employment growth in the Italian LLS 1991-2001



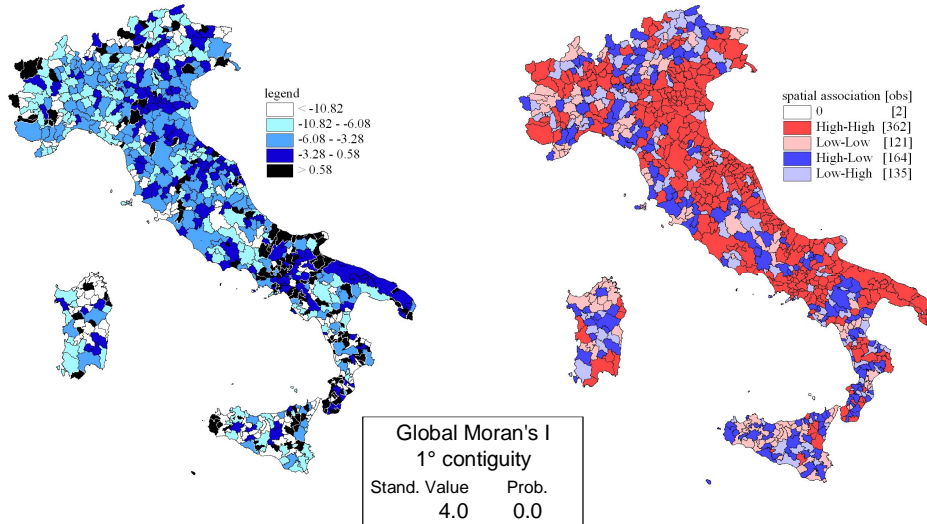
Global Moran's I  
1° contiguity  
Stand. Value Prob.  
Total 10.9 0.0



Wearing apparel. Positive spatial association

- Employment growth

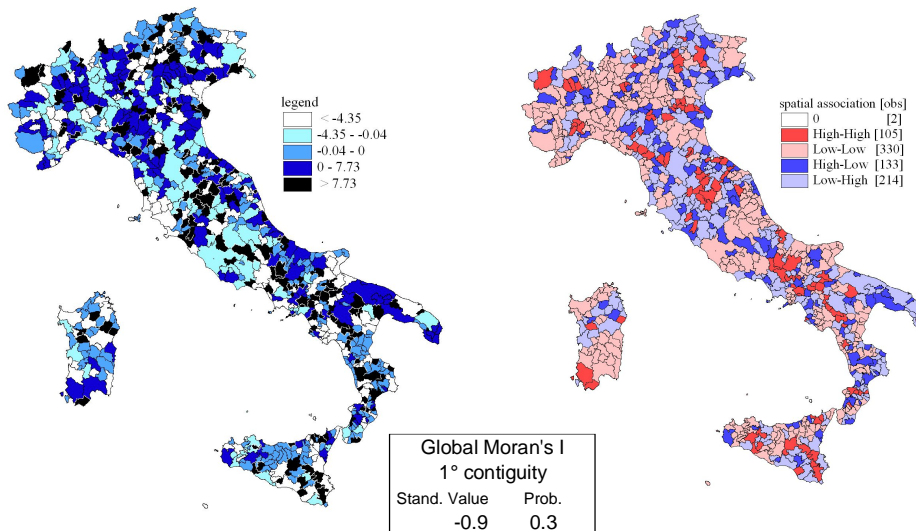
- Moran scatterplot



Chemicals. Negative (not significant) spatial association

- Employment growth

- Moran scatterplot



## The estimation framework

The estimated equation is based on the idea that employment dynamics can be affected by three families of **externalities**

$$\log(L_{ijt+1} / L_{ijt}) = \alpha X_{ijt} + \beta X_{it} + \chi X_j$$

- specific to both local and industry levels ( $X_{ij}$ )
- specific to the territorial area ( $X_i$ )
- specific to the industry ( $X_j$ )

### (1) Local industry level

Various factors which are specific to each industry and to each location:

- specialisation or Marshall externalities ( $SE$ )
- diversity or Jacobs externalities ( $DE$ )
- degree of competition ( $COMP$ )
- scale effects ( $SC$ )

## Local industry level /1

- **Specialisation externalities (SE)**

measured by an index of relative production specialisation or location quotient. They are also known as Marshallian or MAR externalities .

- This variable measures pecuniary and localisation externalities such as:
  - suitable supply of labour force, primary and intermediate goods (Ellison - Glaeser, 1999)
  - the provision of specific goods and services (Bartelsman et al. 1994)
  - the availability of specific infrastructures and networks.
- But also, intra-industry flows of localised knowledge which occurs among similar firms located in the same area (Henderson et al., 1995, Maskell and Malmberg, 1999).

## Local industry level /2

- **Diversity externalities (DE)**

measured by the inverse of the Herfindahl index applied to employment in all sectors except the one considered. They are also known as Jacobs or urbanisation externalities (Jacobs, 1969).

They are expected to influence positively local growth:

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 inter-industries (input-output) relationships and cross fertilisation (mainly in terms of innovative ideas, Duranton - Puga 2001, for a theoretical model).

## Local industry level /3

- **Competition (COMP)**

Measured by an Herfindahl index based on the size distribution of firms (following Lafourcade-Mion (2004) for the computation methodology)

The idea (Porter, 1990) is that local competition encourages innovation and rapid imitation and then local growth. We may also have a negative effect due to incomplete property rights and appropriation of innovations (MAR).

- **Scale effect (SC)**

the average number of employees per firm can be seen as a proxy for economies of scale (O' hUallachàin and Satterthwaite, 1992).

A negative effect can be interpreted as smaller firms being more flexible and cooperative with neighbours thus favouring growth.

In such a way we are able to distinguish between the two effects – scale economies and competition - defining two different indicators and including both of them in the estimated equation (as in Combes, 2000).

## The Herfindahl Index (H)

$$H = \sum_{i=1}^N s_i^2$$

- where  $s_i$  is the market share of firm  $i$  in the market, and  $N$  is the number of firms. Thus, in a market with two firms that each have 50 percent market share, the Herfindahl index equals  $0.50^2 + 0.50^2 = 1/2$ . What if two firms, one with 0.9 and the other one with 0.1.
- $H$  ranges from  $1/N$  to one, where  $N$  is the number of firms in the market.
- A HHI index below 0.01 (or 100) indicates a highly competitive index.  
A HHI index below 0.15 (or 1,500) indicates an unconcentrated index.  
A HHI index between 0.15 to 0.25 (or 1,500 to 2,500) indicates moderate concentration.  
A HHI index above 0.25 (above 2,500) indicates high concentration.
- There is also a normalised Herfindahl index. Whereas the  $H$  ranges from  $1/N$  to one, the normalized Herfindahl index  $H^*$  ranges from 0 to 1. It is computed as:

$$H^* = \frac{(H - 1/N)}{1 - 1/N}$$

- where again,  $N$  is the number of firms in the market, and  $H$  is the usual Herfindahl Index, as above.

## **(2) Local level**

Local factors, common to all industries, refer to a large set of socio-economic phenomena which influence firms performance in the area:

- network externalities: population density (*PD*), small firms (*SF*)
- human capital (*HK*)
- social capital (*SK*)
- labour supply (*PR*)

### **Local level /1 Network externalities**

- **Population density (PD)**

measured by the ratio of resident population per KM<sup>2</sup> (Ciccone-Hall, 1996).

- a positive effect on local growth caused by a higher local demand (home market effect) and the availability of a wider supply of local public services,
- a negative effect if congestion prevails giving rise to pollution and higher input prices.

- **Small firms (SF)**

measured by the quota of small firms (less than 50 employees) within the local economy.

Given the characteristics of the “Industrial districts”, a larger share of small firms may be helpful for local growth since they have to find their optimal production scale outside, through cooperation and integration with other firms in the area and this stimulates the creation of local externalities (Piore - Sabel, 1984)

## Local level /2

- **Human capital (HK)**

measured by the share of population with a university education

A higher availability of well educated labour forces represents an advantage for the localization of firms thus fostering local growth.

- **Social capital (SK)**

measured by 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.

This index should provide a measure of the degree of trust in the local society. A higher degree of propensity to cooperate among firms in a certain area should help local growth since it facilitates knowledge diffusion, decreases transaction costs, and enables firms to take advantage of local externalities.

- **Labour supply (LS)**

measured by the participation rate (labour forces over population age 15-65)

A higher availability of employees in the local labour market reduces the frictions in the labour market, facilitates firms labour demand and therefore influences positively local growth. (Cingano - Schivardi, 2003)

## (3) Industry level

- **Sectoral fixed effects (FE)**

The growth rate in a local industry may also be affected by factors which are idiosyncratic to each sector while they are common to all areas.

These factors can capture the technological progress and opportunities within each industry at the national level.

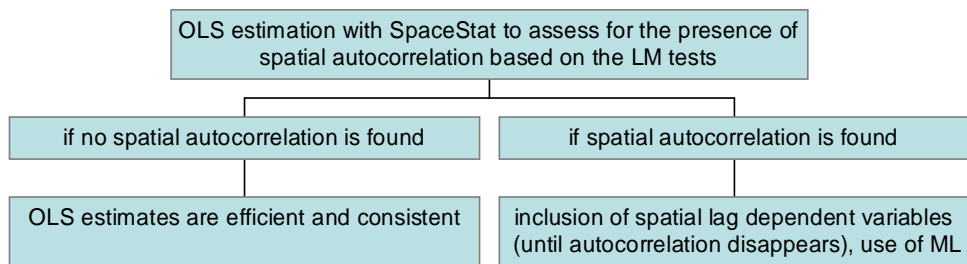
## 6. Econometric estimation The estimated equation

The econometric analysis is based on a simple equation where the growth rate of employment is regressed on some potential factors which are distinguished in three groups:

$$\begin{aligned} \log(L_{ijt+1} / L_{ijt}) = & \\ & = \alpha_1 SE_{ijt} + \alpha_2 DE_{ijt} + \alpha_3 COMP_{ijt} + \alpha_4 SC_{ijt} + \\ & + \beta_1 PD_{it} + \beta_2 SF_{it} + \beta_3 HK_{it} + \beta_4 SK_{it} + \beta_5 LS_{it} + \\ & + \chi_j FE_j \end{aligned}$$

*Note: All explanatory variables are computed at the beginning of the period*

### Estimating procedure



Different sets of regressions:

- Table 4: Panel regression (only OLS)

- Whole economy (26656 observations)
- Macroareas: North-Center and South

- Table 5:

- Sectoral regressions (784 obs.)

- Exclusion of “empty” sectors in both 1991 and 2001

**Table 4. Econometric results for macro-regions (panel)**

Dependent variable: employment growth in the local industry; annual average 1991-2001  
 Estimation method: GLS (cross section weights) with industry fixed effects;  
 Panel estimation by LLS and sectors Level of significance: a=1%; b=5%; c=10%

Variables		Italy	North-Centre	South
Local and industry specific variables	SE specialisation externalities	-3.86 <sup>a</sup>	-3.07 <sup>a</sup>	-6.35 <sup>a</sup>
	DE diversity externalities	0.98 <sup>a</sup>	0.52 <sup>a</sup>	1.89 <sup>a</sup>
	COMP competition	-9.48 <sup>a</sup>	-7.93 <sup>a</sup>	-8.87 <sup>a</sup>
	SC scale effect	0.05	0.19 <sup>b</sup>	-0.13 <sup>a</sup>
Local specific variables	SF small firms	0.49 <sup>a</sup>	0.74 <sup>a</sup>	0.47 <sup>b</sup>
	PD population density	0.00	-0.02	0.02
	HK human capital	0.59 <sup>a</sup>	0.22 <sup>c</sup>	1.02 <sup>a</sup>
	SK social capital	0.04 <sup>c</sup>	0.05 <sup>b</sup>	0.06
	LS labour supply	0.53 <sup>a</sup>	0.27 <sup>a</sup>	1.41 <sup>a</sup>
n. observation		22286	12723	9563

**Table 5. Econometric results for sectors**

Dependent variable: employment growth in the local industry. Annual average 1991-2001 Cross-section estimation by LLS Level of significance: a=1%; b=5%; c=10%  
 Estimation Method: ML: Maximum Likelihood, OLS-W: Ordinary Least Squares Estimation-White robust Standard Error Constant is included

Code	Sector	Estimation method	Obs.	Specialisation externalities	Diversity externalities	Scale effect	Competition	Population density	Small firms	Human capital	Social capital	Labour supply	Spatial lag 1st order	Spatial lag 2nd order
01	Food, beverages and tobacco	ML	794	-4.22 <sup>a</sup>	-2.69 <sup>b</sup>	0.67	-12.33 <sup>a</sup>	-0.05	1.08 <sup>c</sup>	-0.29	-0.25	-0.73	0.14 <sup>a</sup>	
02	Textiles	ML	747	-21.93 <sup>a</sup>	-25.57 <sup>a</sup>	4.76 <sup>a</sup>	-58.60 <sup>a</sup>	0.03	3.86	-8.29 <sup>b</sup>	-0.56	1.65	0.19 <sup>a</sup>	
03	Wearing apparel	OLS-W	773	-2.19	-1.82	2.14 <sup>b</sup>	-21.90 <sup>a</sup>	0.37 <sup>c</sup>	3.74	-0.32	-0.36	2.97		
04	Leather and footwear	ML	602	-20.12 <sup>a</sup>	-43.49 <sup>a</sup>	0.37	-71.76 <sup>a</sup>	-1.83 <sup>b</sup>	1.84	-5.90	-1.75	-5.53	0.11 <sup>a</sup>	0.15 <sup>b</sup>
05	Wood products, except furniture	ML	784	-1.38 <sup>b</sup>	-0.01	0.64 <sup>a</sup>	-14.41 <sup>a</sup>	-0.12	-1.92 <sup>a</sup>	-1.18 <sup>c</sup>	0.01	0.85	0.18 <sup>a</sup>	0.16 <sup>c</sup>
06	Paper	OLS-W	489	-24.47 <sup>a</sup>	-13.03 <sup>c</sup>	2.88 <sup>a</sup>	-65.36 <sup>a</sup>	-2.65 <sup>a</sup>	-6.08	-7.02	-1.94 <sup>b</sup>	-22.01 <sup>a</sup>		
07	Printing and publishing	OLS-W	740	-41.58 <sup>a</sup>	-7.13	16.62 <sup>a</sup>	-31.81 <sup>a</sup>	-0.30	2.08	4.35	-0.03	-6.03 <sup>c</sup>		
08	Coke and refined petroleum products	OLS-W	367	-35.11 <sup>a</sup>	-33.71 <sup>a</sup>	7.76 <sup>b</sup>	-92.56 <sup>a</sup>	-1.03	11.57	3.81	1.25	-7.83		
09	Chemicals and chemical products	ML	596	-31.41 <sup>a</sup>	-10.75	4.68 <sup>a</sup>	-70.91 <sup>a</sup>	-1.46	-7.89	-14.34 <sup>a</sup>	-2.11 <sup>c</sup>	-5.90	0.10 <sup>b</sup>	
10	Rubber and plastic	OLS-W	619	-33.60 <sup>a</sup>	-17.33 <sup>a</sup>	4.67 <sup>a</sup>	-58.41 <sup>a</sup>	-1.42 <sup>a</sup>	-4.14	-8.28 <sup>b</sup>	0.52	-0.04		
11	Non metallic mineral products	OLS-W	781	-11.40 <sup>a</sup>	-7.06 <sup>b</sup>	2.05 <sup>a</sup>	-19.04 <sup>a</sup>	-0.64 <sup>a</sup>	0.13	-3.02 <sup>b</sup>	-0.29	2.18		
12	Basic metals	OLS-W	466	-27.34 <sup>a</sup>	-9.48 <sup>b</sup>	2.65 <sup>a</sup>	-76.45 <sup>a</sup>	-3.44 <sup>a</sup>	-3.75	-5.86	-2.69 <sup>a</sup>	-30.08 <sup>b</sup>		
13	Fabricated metal products	ML	784	-3.00 <sup>a</sup>	5.26 <sup>a</sup>	-0.43	2.52	-0.10	-0.63	-1.36 <sup>b</sup>	-0.03	0.55	0.15 <sup>a</sup>	
14	Machinery	OLS-W	737	-21.12 <sup>a</sup>	-13.50 <sup>a</sup>	4.72 <sup>b</sup>	-46.38 <sup>a</sup>	-1.35 <sup>a</sup>	-0.74	-2.96	-0.48	-2.27		
15	Office, computing and electrical machinery	OLS-W	695	-28.53 <sup>a</sup>	-1.77	2.25	-67.86 <sup>a</sup>	-1.43 <sup>b</sup>	1.08	-9.96 <sup>a</sup>	-2.08 <sup>a</sup>	-2.82		
16	Radio, tv, communication equipment	ML	682	-31.09 <sup>a</sup>	-5.47	7.55 <sup>a</sup>	-47.82 <sup>a</sup>	-1.24	-0.18	-4.42	-0.04	-1.05	0.18 <sup>a</sup>	
17	Medical, precision and medical instruments	ML	742	-36.30 <sup>a</sup>	-11.38 <sup>b</sup>	5.08 <sup>a</sup>	-46.56 <sup>a</sup>	-1.10 <sup>c</sup>	0.46	0.19	0.83	2.85	0.13 <sup>a</sup>	
18	Motor vehicles, trailers and semi trailers	OLS-W	366	-26.58 <sup>a</sup>	0.46	9.69 <sup>a</sup>	-83.24 <sup>a</sup>	-3.32 <sup>b</sup>	-7.14	0.58	-2.57	-15.49		
19	Other transport equipment	OLS-W	454	-27.35 <sup>a</sup>	-14.24 <sup>a</sup>	4.83 <sup>a</sup>	-59.25 <sup>a</sup>	-1.37 <sup>c</sup>	-1.65	6.26	-1.53	-12.57		
20	Furniture, recycling and other	OLS-W	778	-21.86 <sup>a</sup>	-6.33	3.17 <sup>b</sup>	-35.97 <sup>a</sup>	-0.36	-2.56	-6.19 <sup>a</sup>	-0.76	1.09		
21	Building	ML	784	-8.56 <sup>a</sup>	-0.08	-0.99 <sup>a</sup>	1.61	-0.06	0.69 <sup>a</sup>	0.12	0.03	-0.28	0.26 <sup>a</sup>	
22	Motor vehicles trade and repair	OLS-W	784	-2.02 <sup>b</sup>	0.35	-0.55	-12.34 <sup>c</sup>	-0.09 <sup>a</sup>	0.70 <sup>b</sup>	0.55 <sup>b</sup>	0.00	0.46 <sup>b</sup>		
23	Wholesale trade	ML	784	-10.20 <sup>a</sup>	3.82 <sup>a</sup>	-0.11	-7.48 <sup>b</sup>	0.40 <sup>a</sup>	1.44 <sup>a</sup>	1.16 <sup>c</sup>	0.03	0.80	0.11 <sup>a</sup>	
24	Retail trade	ML	784	-1.93 <sup>a</sup>	0.58 <sup>c</sup>	1.70 <sup>a</sup>	-20.45	-0.01	0.79 <sup>a</sup>	0.71 <sup>a</sup>	-0.02	0.53 <sup>a</sup>	0.12 <sup>a</sup>	
25	Hotel and restaurant	ML	784	1.89 <sup>a</sup>	1.26 <sup>a</sup>	0.30	-15.15 <sup>a</sup>	-0.01	0.61 <sup>b</sup>	0.92 <sup>a</sup>	-0.01	0.63 <sup>a</sup>	0.27 <sup>a</sup>	
26	Transport services	OLS-W	784	-9.14 <sup>a</sup>	0.37	-0.07	-6.19	0.27 <sup>a</sup>	1.17 <sup>b</sup>	0.79	0.05	0.13		
27	Auxiliary transport and travel agencies	OLS-W	757	-49.44 <sup>a</sup>	-23.06 <sup>a</sup>	15.63 <sup>b</sup>	-55.67 <sup>a</sup>	0.77 <sup>b</sup>	-2.49	4.79 <sup>c</sup>	-1.39 <sup>c</sup>	0.79		
28	Post and telecommunication	OLS-W	784	-2.13 <sup>a</sup>	-0.20	-0.11	1.47 <sup>b</sup>	0.17 <sup>a</sup>	0.03	0.19	0.14	-0.23		
29	Financial intermediation and insurance	OLS-W	784	-13.73 <sup>a</sup>	0.34	0.92	-8.00 <sup>c</sup>	0.01	-1.12	2.65 <sup>a</sup>	0.05	0.37		
30	Real Estate activities	ML	717	-32.91 <sup>a</sup>	-11.41 <sup>a</sup>	-7.06 <sup>a</sup>	-43.98 <sup>a</sup>	-0.75	-6.31 <sup>a</sup>	-0.96	0.96	2.50	0.08 <sup>b</sup>	
31	Renting of machinery and personal goods	OLS-W	713	-47.90	-35.49 <sup>a</sup>	2.26	-47.19 <sup>a</sup>	-0.75 <sup>b</sup>	4.28	4.66 <sup>b</sup>	0.00	0.48		
32	Computer and related activities	OLS-W	770	-52.80 <sup>a</sup>	-10.53 <sup>a</sup>	1.21	-38.97 <sup>a</sup>	-0.29	0.82	9.57 <sup>a</sup>	0.66	-0.28		
33	Research and development	ML	663	-51.43 <sup>a</sup>	-22.59 <sup>a</sup>	5.00 <sup>a</sup>	-55.19 <sup>a</sup>	-0.66	-1.69	-0.14	0.24	-15.70 <sup>a</sup>	0.09 <sup>a</sup>	
34	Other professional services	ML	784	-9.09 <sup>a</sup>	2.16 <sup>a</sup>	-0.08	-10.47 <sup>c</sup>	-0.04	0.35	4.13 <sup>a</sup>	0.07	0.20	0.12 <sup>a</sup>	



## **Econometric results/1 Spatial autocorrelation**

- In 15/34 sectors we have detected spatial autocorrelation and therefore a ML estimation has been performed with the inclusion of a 1° order contiguity spatial lag dependent variable; in two sectors also the 2° order is considered.
- In all cases spatial autocorrelation has been controlled and the spatially lagged employment growth turns to be positive and significant.
- The employment growth rate in a certain LLS is positively influenced by the employment dynamics in the contiguous areas.
- Contagion models of growth through space, localised diffusion, imitation, contiguity, “third Italy”.

## **Econometric results/2 Marshallian externalities (ij)**

- **Absence of specialisation externalities:**  
the coefficient of SE is negative and highly significant in all the sub-sets considered (geographical and sectoral)

This outcome confirms previous studies for the US (Glaeser *et al.*, 1992), France (Combes, 2000b) and Italy (Cunat - Peri 2001; Usai - Paci, 2003)

The absence of Marshallian externalities at the LLS level can be partly explained by the strong reorganization processes of the already highly specialized local systems induced by the economic stagnation of the nineties.

More, specifically, the negative relationship can be explained by the life cycle of products (Duranton - Puga, 2001) where the mature products of the traditional Italian industrial districts are now re-located in low-wages countries (East Europe, Asia)

### **Econometric results/3 Diversity externalities (ij)**

- **Positive role of diversity externalities**

The presence of a differentiated range of production activities appears to foster local growth for the whole economy, and for the macro areas.

This result confirms findings by Glaeser *et al.*, 1992 Henderson et al. 1995 for the US; Combes, 2000 for France; van Soest et al. 2002 for Netherlands

Given the growing complexity of technology and production, firms benefit from the inter-industries input-output relationships and from the exchange of knowledge.

- **Contrasting evidence at the sectoral level**

A positive and significant influence on employment dynamics is detected in 5 sectors, mainly in services, while the coefficient is negative and significant in 19 sectors.

### **Econometric results/4 Market structure (ij)**

- **The competition index (COMP) is always negative and significant**

A competitive environment encourages the growth of the local industry.

This results is confirmed for 30/34 sectors.

Porter's idea that more competition is helpful for growth at the local level is confirmed.

- **The results for the average firm size (SC), are mixed**

The variable is not significant for the whole economy and it reveals contrasting effects when we split the sample:

- a positive influence of economies of scale appears for the North-Centre
- a negative effect is prevailing in the Mezzogiorno regions.
- at the sectoral level a positive significant sign prevails in manufacturing (16/21)

Note that the Italian production system is characterised by a very low average dimensions of firms which often try to reach market efficiency cooperating with other firms rather than increasing the internal dimension.

## **Econometric results/5 Network externalities (i)**

- **A positive role of network externalities**

the presence of small firms (SF) enhances local growth in all territorial areas and some sectors.

These outcomes are in accordance with the Italian production structure characterised by systems of small and medium sized firms and are consistent with results found for Competition and Scale effects.

- **Contrasting evidence for Population density (PD)**

The phenomena of population agglomeration and/or congestion are not statistically significant in the panel estimations.

However, at the sectoral level, a negative relationship is detected in 27 sectors (statistically significant in 12), signaling for the presence of congestion effects mainly in manufacturing.

## **Econometric results/6 External capital**

- **Positive role of human capital (HK)**

University education is a positive determinants of local growth for the whole country and also for the geographical breakdown.

Sectoral results are interesting:

- a positive statistically significant effect prevails in the services sectors (9/13)
- negative signs (often not significant) in the manufacturing sectors which, given the traditional composition of the Italian industry, can be interpreted as a less strategic role played by a well educated labour forces.

- **Contrasting evidence for social capital (SK)**

cooperation among firms is positive and statistically significant in the whole country and in the North centre, but is not statistically significant in the South.

At the sectoral level few coefficients are statistically significant, a negative sign prevails in the manufacturing sectors whilst a positive sign is detected in most service sectors.

## Final remarks

- **Results** confirm the existence of a **very complex picture** when it comes to agglomeration forces operating at small geographical level within specific industries.
- The effects of **idiosyncratic factors** seem to prevail over a unified model, especially in a (relatively short) period of time characterised by a negative business cycle like the one considered .
- However, some **general findings** can be outlined:  
local employment growth can benefit from a production system based on a diversified network of small flexible firms, operating in a competitive environment, characterized by well educated labour forces and cooperation among firms and surrounded by growing areas.
- **Policy implications:** diversification rather than specialisation (risk differentiation), scientific and technological parks to promote inter-industries technology exchange, anti-trust policies, high education, support geographical production systems with common services.