Job Creation in Italy: Geography, Determinants and Perspectives

Giovanni Peri

Alejandro Cuñat

The HWWA is a member of:

- Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz (WGL)
- Arbeitsgemeinschaft deutscher wirtschaftswissenschaftlicher Forschungsinstitute (ARGE)
- Association d'Instituts Européens de Conjoncture Economique (AIECE)

Job Creation in Italy: Geography, Determinants and Perspectives

Giovanni Peri[a]
Alejandro Cuñat[b]

[a] Universitá Bocconi (Milano) and European University Institute (Florence)
[b] IGIER (Milano) and CEPR (London)

HWWA DISCUSSION PAPER

Edited by the Department
EUROPEAN INTEGRATION
Head: Dr. Konrad Lammers

Giovanni Peri
c/o IGIER,
Via Salasco 3
20138 Milano
Italy
e-mail: giovanni.peri@uni-bocconi.it

Alejandro Cuñat
c/o IGIER
Via Salasco 3
20138 Milano
Italy
e-mail: ale.cunat@uni-bocconi.it

Contents

List of Tables

List of Figures

Abstract

The extremely large disparities in employment rates across Italian regions, and the bad performance of the Italian economy in terms of job creation in the 80´s and early 90´s make job creation a top-priority in the economic policy agenda. This paper uses data on employment from 784 Local Labor Systems (LLS´s) covering the whole Italian territory to analyze job creation and its covariates for the 1981-1996 period. Local agglomeration economies, in particular input-output linkages, social characteristics, in particular the crime rate, and infrastructure growth are found to be important determinants of employment growth across Italian LLS´s. Using these estimates and data relative to 1996, we assess the potential for job creation in the LLS´s for the next decade. The Northeast still proves to be the area with strongest potentials, while in the South Abruzzi and Northern Campania are the areas best equipped for filling their gap with the North.

1   Introduction

As economists and policy-makers have often remarked, two disappointing trends stand out in the economic performance of Italy in the 80's and early 90's. The first is the dismal performance of job creation during these two decades.[1] The second is the remarkable disparity in regional and sub-regional economic performances in the country. This paper addresses both issues, analyzing job creation across Italian geographical units and identifying the positive and negative correlates of employment growth across sub-regional units.

Job creation is an extremely urgent issue both for the Italian economy and for the rest of continental Europe. Among the G7 countries, Italy has been the worst performer in terms of employment growth in the 80's and first half of the nineties, followed by the other continental European economies (France and Germany). Such performance has left Italy in 1998 as the country with the highest unemployment rate (12.3%) and the lowest participation rate (58%) among the large industrialized economies.[2]

The large cross-regional dispersion in job creation in the 80's and 90's, on the other hand, has had two important negative consequences on the Italian economy. First, due to the underperformance of employment growth, GDP growth in the Mezzogiorno has been particularly slow during the 90's.[3] Second, Italy is the E.U. country with the highest regional dispersion of unemployment rates as of year 1997. While the Italian Northeastern regions perform close to full employment (unemployment rates at 5.1%) and among the best in Europe, some Southern regions agonize at unemployment levels as high as 26% (Campania).[4]

The existing literature on Italian regional disparities[5] looks mostly at the evolution of income per capita (or per worker) in the frame of the so-called "convergence analysis." This paper complements and integrates previous work by considering the creation of jobs across Italian localities and bringing the analysis to the very detailed "Local Labor System" level. In so doing, we gain a much richer understanding of job creation within Italy: regions themselves are not homogeneous units. In the Mezzogiorno, for example, amidst a general disappointing performance, some locations and districts have been very successful in creating jobs.

We look into agglomeration economies operating at the local level, such as linkages, externalities and technological spillovers, therefore checking for those economic-geography theories that consider agglomeration forces as an engine of job creation and growth. Moreover, we assess the importance of several other variables such as the quality of the social environment, the degree of social cohesion, the literacy level, and the growth of public infrastructures, in promoting job creation in the 1981-1996 period in Italy.

---

[1] The Italian performance in creating jobs for the years '97, '98 and '99 has been better and close to the average of the seven largest economies.

[2] These data are from the OECD Economic Outlook 1999.

[3] See Casavola and Sestito [8] and Helg et al. [18] for an account of this fact.

[4] See, for instance, European Commission [11].

[5] Notably Forni and Paba [13], Paci and Pigliaru [31] and [32], and Paci and Saba [33] among others.

Our rather simple framework for the analysis is closely related to the "convergence analysis" used in the growth literature (e.g., Barro [3]). Growth rates of employment across local labor systems are determined by regional growth rates and by the convergence dynamics to long-run relative employment densities. The former are affected by the growth of technology and infrastructures while long-run employment densities are determined by local factors affecting the productivity of labor, since the cost of labor has evolved rather uniformly across areas.[6]

Based on the theories of agglomeration externalities pioneered by Marshall [29], we analyze local agglomeration economies that make local systems more productive, and thus support higher employment density in their balanced growth paths. Inspired by recent findings in the empirical growth literature, such as Barro and Sala i Martin [4], Knack and Keefer [20], Temple and Johnson [41], we also consider some measures of social variables (participation to vote, crime rates, illiteracy rates, social conflict) as potential determinants of higher employment. Finally, in order to assess the role of infrastructures,[7] we analyze the growth of public capital and its effect on job creation. In the final part of the paper we carry out a simple exercise to identify the local labor systems with the strongest potential for future growth, based on their current characteristics (in 1996) and convergence dynamics. We construct a map of the potential for future job creation across Italian local labor systems and briefly discuss the potentialities and hurdles for future job creation in different geographical areas.

The rest of the paper is organized as follows: Section 2 provides a description of the differences in job creation across macro-areas, provinces and local labor systems in Italy. Section 3 discusses the framework of our analysis. In section 4 we describe the indices used as explanatory variables for employment growth: local agglomeration economies, social and human variables, public infrastructure growth. Section 5 presents the estimates of the partial correlations of these variables with employment growth for the 1981-1996 period. Section 6 performs an exercise to assess the current "job-generating potential" of Italian LLS's, and section 7 concludes.

2   Job Creation: a Descriptive Analysis

In this section we document the degree of heterogeneity of job creation within Italy in the 1981-1996 period to convince the reader that we can really learn something by analyzing such variation. We use data from the Italian Census of Manufactures and Services held in 1981 and in 1996. The census data contain a count of employees over the national territory for 47 sectors (made compatible across censi) and in 8'100 comuni (very small municipalities).[8] While keeping

---

[6] We document this in Section 3.

[7] Other works considering the role of infrastructures on productivity are Picci [35], Aschauer [1], Garcia Mila et al. [15]

[8] The list of Sectors, Comuni and Local labor Systems is available from the authors upon request.

the definition of industries provided by ISTAT, we have aggregated the geographical data in 784 Local Labor Systems (Sistemi Locali del Lavoro), using the definition provided by Sforzi and technically implemented using the groupings in ISTAT [27]. LLS's are geographical units which, as opposed to regions and provinces, are not arbitrarily defined from an economic point of view. In fact, these units try to match the definition of labor markets as closely as possible in the following sense:

1. They are made of spatially connected "comuni".

2. More than 75% of the residents in the unit work within the unit itself.

3. They must be recognized as local labor markets in the sense that local firms mostly employ local work-force.

Thus, these units have been defined keeping into account that some economic interactions, such as labor pooling and diffusion of technological knowledge, are likely to be particularly intense within themselves. The rationale used to construct these LLS's is that they represent relatively independent and self-contained labor markets. The 784 LLS's cover the whole Italian territory, and identify labor markets ranging from large towns (such as Milan, Rome, Turin, Florence), to medium-size towns (such as Modena, Padova, Prato, Avellino, Catanzaro) down to very small units.

We consider only the private industrial and service sectors in our analysis. We are aware that a major omission is the public sector (mainly health care, education and public administration), which is rather large in some regions and has created a large number of jobs. However, we are interested in analyzing the creation of employment in the private sector to isolate the market determinants of differential job creation.

2.1   LLS's, Provinces and Macro-regions

Describing labor creation in Italy with an emphasis on its uneven geographical distribution is better done by choosing several levels of geographical aggregation. By doing this we perceive the existence of different "degrees" of such a problem. First, we consider five macro-areas (Table 1): the Northeast of the country is consistently the best performing area with positive rates of job creation in the 1981-1996 period (opposite to the rest of the country, where jobs have been destroyed or barely kept constant). Even during the recession of the early 90's the Northeast still exhibits an increase in the number of jobs. At the opposite end of the range of performance, the Southwest[9] has been consistently the worst performer throughout the period and particularly during the recession 1991-1996. In fact, it has destroyed private-sector jobs at a rate of 0.38% a year. The difference in employment growth between the Northeast and the Southwest has

---

[9] We include Sicilia and Sardinia, the two islands, with the Southwest

been 0.8% points a year, which is as large as the difference between Italy (the worst performer in EU) and the UK (the best performer in EU) during the same period.

<div align="center">TABLE 1: EMPLOYMENT GROWTH IN MACRO AREAS</div>

Area	$g_E('81 -'96)$	$g_E('91 -'96)$
Northeast	0.43%	0.20%
North West	-0.33%	-0.06%
Center	0.02%	-0.06%
South East	0.06%	-0.46%
Southwest	-0.38%	-0.53%
Source: Our Calculations on ISTAT data		
Employment Growth is in average yearly percentage rates		

This macro-regions' summary conceals some larger differences in the job creation of smaller geographical units, but already gives the feeling of the magnitudes involved. Figure 1 shows geographical differences in detail by disaggregating Italy by province, and representing employment growth in yearly percentage rates with the range of the gray color: a darker gray means larger job creation. Besides confirming the concentration of good performing provinces in the Northeast and the concentration of bad performing provinces in the Southwest+islands and the Northwest, Figure 1 also shows the large dispersion of performances. The standard deviation of the distribution of growth rates for provinces is 0.12%, and the difference between the lowest and the highest is around 0.9%.

Finally, moving to the smallest geographical units, the LLS's, we observe a remarkable heterogeneity in their size, density and performances. Each of them is considered as one single observation in our econometric analysis. The density of population (in 1996) ranged from 3500 inhabitants per square kilometer in Naples 10 inhabitants per square kilometer in Crodo (Lombardia). Total population ranged from 3,312,000 in Rome to 2851 in Limone sul Garda (Lombardia). The yearly growth rates of employment (whose summary statistics and top and bottom tails are reported in Table 2) in the 1981-1996 period range from + 7.8% a year in Melfi (Basilicata) to -6.1% a year in Pontebba (Friuli Venezia Giulia). These two extremes are very peculiar cases: Melfi owes its employment growth to a FIAT establishment, while Pontebba has been depopulated as a consequence of the Friuli earthquake. However, even considering the next two, more standard cases (Canazei in the top and S.Teresa di Gallura in the bottom), the difference is a huge 8% a year. The standard deviation of yearly growth rates of employment is 1.2% and the top twenty LLS's experienced a growth rate of employment above 2% a year, which is larger than the best performing countries in the world.

Notice that the smaller the unit of analysis the larger the variance across locations, simply because we are averaging over a smaller sample. Nevertheless,

Employment growth 1981-1996

Province italiane
da Annual growth of Employment 198

- 0.11 a 0.443 (11)
- 0.054a 0.11   (13)
- 0.022a 0.054 (13)
- -0.028a 0.022 (13)
- -0.063a-0.028 (14)
- -0.098a-0.063 (12)
- -0.138a-0.098 (13)
- -0.432a-0.138 (14)
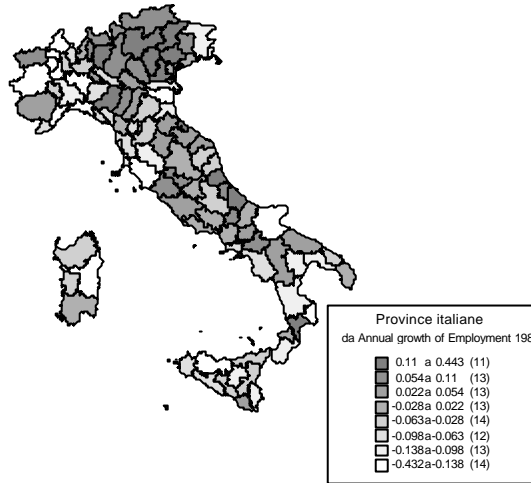
Figure 1: Job Creation in Italian Provinces

the fact that LLS's are defined as single labor markets makes them appropriate and meaningful units for the analysis of employment. Therefore, looking into the covariates at the local level is likely to help us learn about the importance of different factors for job creation.

TABLE 2: EMPLOYMENT GROWTH IN LLS

Top LLS	$g_E('81 -' 96)$	Bottom LLS	$g_E('81 -' 96)$
Melfi (BAS.)	7.83%	Pontebba(FVG)	-6.0%
Canazei (TAA)	3.77%	S. Teresa di Gallura (SAR)	-4.5%
Pietralcina (CAM)	3.35%	Bobbio (EMR)	-4.08%
Apice (CAM)	2.70%	Porto Tolle (VEN)	-3.71%
Martina Franca (PUG)	2.60%	Biccari (PUG)	-3.59%
Average:-0.4%		Std. Dev:1.27%	
Source: Our Calculations on ISTAT data			

Before doing that, though, let us also take a look at the sector dimension of job creation. Certainly job creation varies largely across sectors. In Europe the service sector, in particular business, banking and finance services, has been the largest creator of jobs, while manufacturing has destroyed jobs. In our data

Province italiane
da Colonna C

■	0.14 a 0.37 (13)
■	0.102a 0.14 (14)
■	0.068a 0.102 (13)
■	0.004a 0.068 (12)
□	-0.031a 0.004 (13)
■	-0.068a -0.031 (11)
□	-0.11 a -0.068 (13)
□	-0.312a -0.11 (14)
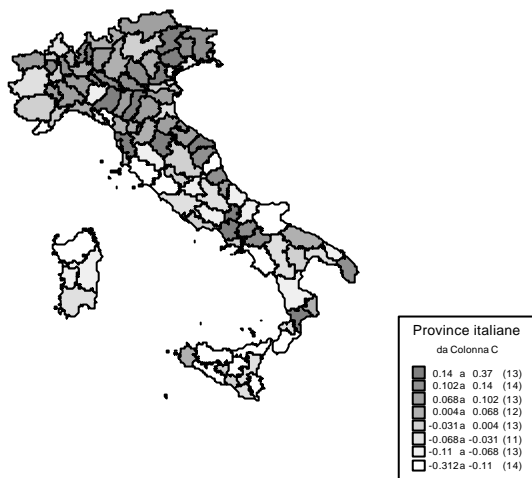
Figure 2: Job Creation net of Industry-Composition

the worst performing sector has been "Metallic Products," which lost jobs at a rate of 3% a year during the 1981-1996 period, while the best performing sector has been "Business services", which created jobs at a rate of 2.8% per year. We do not intend to analyze the sector dimension of the problem in detail; shift-share analysis relative to the Italian and other OECD economies has been done already (see Garibaldi and Mauro [16] and Marimón and Zilibotti [28]), finding somewhat mixed results as far as the sector-contribution to explain job creation is concerned.

Nevertheless, we claim that our geographical analysis reveals something more than just different job creation rates due to specialization of LLS's in different sectors: large differences in job creation persist once we "clean" the sector effect. Figure 2 shows the intensity of job creation in provinces after "cleaning" for its industry composition.[10] Each province's performance is obtained by aggregating the growth rate of employment in all its industries, measured as deviations from industries' national average. Both from a look at the picture and from summary statistics we notice the excellence of the Northeast, the large dispersion in performances and the disadvantaged position of the Southwest-Islands, while the Northwest, once we eliminate the sector effect, does not look as bad as before. The standard deviation of province job creation, after cleaning for the sector effect, is still 0.12%, the difference top-bottom is 0.68%, and the correlation with the distribution of raw job creation is a very significant 0.53.

---

[10] The maps show the value of variables by province obtained averaging over LLS's' belonging to that province.

**DIVARI DI COSTO DEL LAVORO E DI PRODUTTIVITÀ
DEL MEZZOGIORNO RISPETTO AL CENTRO-NORD)**
(Settore della trasformazione industriale. Indice: Centro-Nord=100)
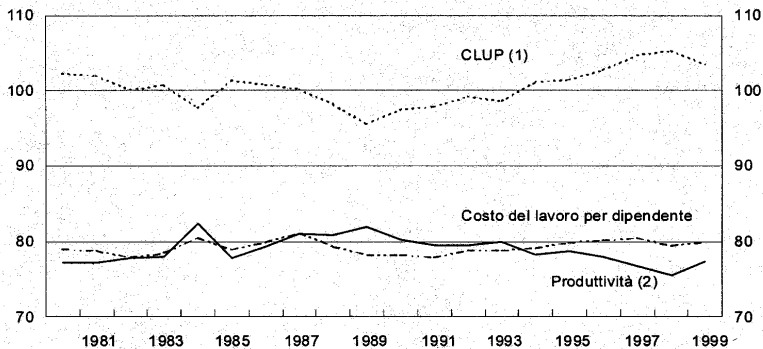
Fonte: elaborazioni su dati Istat e Svimez.
(1) Costo del lavoro per unità di prodotto. – (2) Valore aggiunto per unità di lavoro.

Figure 3: North/South ratio: Unit labor cost, productivity and CLUP. Source: Banca d'Italia [2]

Our goal in the rest of the paper is that of analyzing these "sector-cleaned" differences in job creation across Italian LLS.

3 Labor Demand

Within a country in which the wage level grows at a uniform rate across regions, and goods are freely traded so as to equalize inflation across regions, labor demand determines employment. Differences in labor demand across locations translate into different employment levels, given the homogeneity on the "supply side" due to wage centralization. In spite of lacking data on regional wages and labor cost we can provide some evidence that the labor costs for unit of product have remained rather constant (at least) between the North and the South of the country, in the period 1980-1996.[11] Figure 3, taken from Banca d'Italia [2], shows the near constancy of the North-South ratio of labor costs and of labor productivity, implying that also the cost of labor per unit of output (CLUP) has remained basically unchanged during this period. Considering this piece of evidence as suggestive of a similar behavior across the Italian regions over the period considered, we maintain the hypothesis of uniform growth in labor costs across LLS's for the rest of our paper.

---

[11] A debate has been raised on north-south productivity and wage measures, we refer to Casavola et al. [9], Ferrero and Invernizzi [12], and Ginzburg et al. [17] for an overview.

What determines demand for labor therefore is the productivity of a new job in a location; thus, the factors that make a locality more productive will ultimately support a larger labor demand and, for a given initial level of employment, they will cause larger employment growth in it. We illustrate our model by adopting a slightly modified version of the classical model used in the growth literature. In our case, given the uniformity of wage growth within the country, what we explain is the differential growth in employment across LLS's.

3.1 The Model

The model sketched below provides an easy framework to justify the empirical specification that we estimate in section 5. We consider industry z in LLS i as the unit of our analysis. The production function, expressed in output per unit of area at time t is:

$$(y_{zi})_t = (e_{zi}, X_i) A(T_{zt}, G_{rt}) f((l_{zi})_t, (k_{zi})_t), \qquad (1)$$

where $(y_{zi})_t$, $(l_{zi})_t$ and $(k_{zi})_t$ are, respectively, the output produced, the employment and the physical capital used, per unit of area, in sector z in LLS i in period t. The function $f((l_{zi})_t, (k_{zi})_t)$ exhibits decreasing returns to scale due to the existence of fixed local factors such as land. $A(T_t, G_{rt})$ is the part of total factor productivity that depends on the level of general technology, different across sectors, T_{zt} [12] and public infrastructures at the regional level G_{rt}. Both T_{zt} and G_{rt} are assumed exogenous. They grow in the long run, and while we assume the growth of general technology to differ across sectors [13] we allow for different (exogenous) growth rates of public infrastructures across regions. As the decision about public infrastructure growth is taken by the central government (often following political motivations) we think this variable could be easily regarded as exogenous to the local economies.

Finally, is the part of total factor productivity that depends on the intensity of local agglomeration externalities for sector z in locality i, denoted by e_{zi}, and on other local characteristics such as the social and human environment, indicated with X_i. These factors, although probably endogenous in the very long run, change very slowly. Therefore their relative level across localities is extremely persistent over time. Moreover, they are truly predetermined for each single sector/LLS, whose employment growth we are analyzing. Therefore we consider them "exogenous" and in the empirical implementation we measure them at the beginning of the period.

---

[12] As opposed to localized technology, whose effects we capture using a measure of local knowledge spillovers $Techflow_{iz}$.

[13] It would be desirable to allow for different growth of general sector-technology across regions. However, we do not have a measure of technological growth at the regional level independent from employment growth. See Peri and Cunat [34] for an attempt to capture this variable using regional TFP growth rates.

In the long run, factor demand for sector z in location i is obtained by equating the factor's marginal productivity to its payments. We assume the price of goods as well as the price of labor and physical capital to be equal across LLS's. The equality between marginal productivity of labor and wage, therefore, determines "long-run" labor demand.

Consider the production function $f(l_{zi}, k_{zi}) = l_{zi}^{\mu} k_{zi}^{\nu}$ as an illustrative case.[14] We derive the demand for labor assuming that each local sector also chooses its capital to equate its marginal productivity to the rate of return r. We obtain the following expression:

$$(l_{zi}^*)_t = \Phi(r, w)_t \, (A(T_{zt}, G_{rt}) \ (e_{zi}, X_i))^{\frac{1}{1-\mu-\nu}}, \tag{2}$$

where $\Phi(r, w) = \left(\frac{w^{\nu+1} \nu^{\nu} \alpha^{1-\nu}}{r^{\nu}}\right)^{\frac{1}{1-\alpha-\nu}}$. The long-run labor demand at the local industry level $(l_{zi}^*)_t$ depends on local agglomeration economies e_{zi} and on local social factors X_i, which are relatively stable and therefore considered constant, and on general technology T_{zt}, which could differ across sectors, and infrastructures G_{rt}, whose endowment vary across regions. In our analysis, we assume a common growth rate of wages and interest rates, while we allow general technology to grow at different rates across sectors and public infrastructures to grow at different rates across regions. Taking logs of the expression 2 for t and $t-1$, and substracting we get:

$$\Delta \log(l_{zi}^*)_t = \log(l_{zi}^*)_t - \log(l_{zi}^*)_{t-1} = \alpha_z + \beta_2 \Delta \log(G_{rt}), \tag{3}$$

where α_z are sector-specific constants and β_2 is the elasticity of $A(T_t, G_{rt})$ with respect to G_{rt}. Therefore the long-run growth of labor demand on the balanced growth path (BGP) is equal to a constant sector-specific rate and a region-specific component depending on the growth of public infrastructures. On top of this growth, though, employment is also subject to convergence dynamics towards the relative balanced growth path (BGP) levels. These dynamics depend on the initial level of employment density in industry z in LLS i relative to its BGP level. Assuming sluggishness in the movement of employment between LLS, the growth rate of $(l_{zi})_t$ can be written as follows:

$$\Delta \log(l_{zi})_t = \alpha_z + \beta_2 \Delta \log(G_{rt}) + F(l_{zit-1}^*, l_{zit-1}) \tag{4}$$

Equation 4 is an "ad hoc" adjustment equation, that expresses the change in employment for an industry in a LLS as the sum of the BGP growth rate of employment $\alpha_z + \beta_2 \Delta \log(G_{rt})$, and the convergence dynamics from the initial level of employment l_{zit-1} to its target (BGP) level l_{zit-1}^*. The specification in 4 is very similar to a "convergence equation" in a cross-regional growth analysis.

---

[14] We impose the restriction $(\mu + \nu) < 1$.

Using, for instance, the notation and terminology in Barro[3], that type of analysis expresses the growth of per capita income (Δy) as a function of its "target level" (i.e. BGP level) y^* and of its initial level y. Allowing different national BGP growth rates captured by country dummies, D_c, the estimating equation he proposes is $\Delta y = D_c + F(y, y^*)$, which is very similar to our equation 4. The differences is that we study the dynamics of employment density rather than per capita income, and that our units of observation are LLS, allowing for region-specific and sector specific common growth rates.

Let us substitute the exogenous (slowly changing) determinants from 2 for the BGP level l^*_{zit-1} in 4. If we write function F in log linear form, we get:

$$\log(l_{zi})_{t_1} - \log(l_{zi})_{t_o} = \alpha_z + \beta_1 \log(l_{zi})_{t_o} + \beta_2 (\Delta \log G_r) + \qquad (5)$$
$$+ \beta_3 (Aggl.Economies_{zi})_{t_o} + \beta_4 (Social\ Factors_r)_{t_o}.$$

The left-hand side is the growth rate of employment in sector z in LLS i, calculated as the logarithmic change of l_{zi}., which is the employment per unit of area (density of employment). Notice that, as the area of an LLS is constant over time, the growth rate of l_{zi} is both the growth rate of density and of employment. α_z is the sector-specific productivity growth, β_1 is a sort of "convergence" coefficient, and captures the effect of initial employment density on employment growth. β_2 is the elasticity of employment growth to long-run growth of public infrastructures. Given the initial level of employment density, β_4 and β_5 capture the elasticity of employment growth to agglomeration economies and to socio-human factors, which are measured at the beginning of the period.

The variable which is object of our analysis is the density of employment per unit of area, which is very different across localities due to the presence of agglomerations. Therefore it is very important to control for the determinants of the BGP (the measures of the intensity of local agglomeration economies as well as socio-human characteristics). These local characteristics change very slowly and are exogenous to the single firm's decision on where to create jobs. Thus, we consider them as predetermined.

4   Measures of Local Characteristics

Equation 5 considers the growth of public capital, the predetermined local agglomeration economies and the local socio-human environment, as the explanatory variables of employment growth after controlling for its initial level. In this section we analyze each of these variables, referring to the theoretical and empirical literature to justify their choice and we illustrate their measurement and geographic distribution in Italy.

yearly growth of public capital 1981-1996

Regioni italiane
da growth rate

- 1.4 a 2.41 (3)
- 1.16 a 1.4 (2)
- 1.01 a 1.16 (1)
- 0.81 a 1.01 (3)
- 0.77 a 0.81 (2)
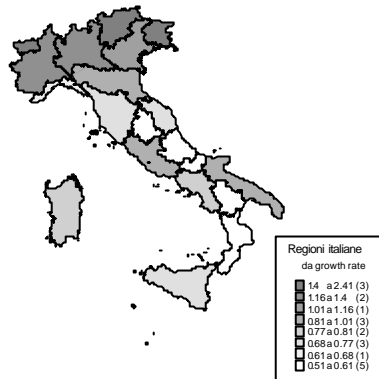- 0.68 a 0.77 (3)
- 0.61 a 0.68 (1)
- 0.51 a 0.61 (5)

Figure 4: Growth of Infrastructures in Italian Regions

4.1   Infrastructure Growth

Improvements of local infrastructures, especially those affecting communication and transport, might be an important determinant of local productivity. First, infrastructures are important productive inputs that may enhance the efficiency of labor substantially. Policy prescriptions, such as the Delors Report (1989) and the whole policy of European Structural (regional) Funds, emphasize the provision of infrastructures as key for development. The economists' view of the role of infrastructure is less unanimous, with some papers providing support to the positive effect of infrastructure on productivity (Aschauer [1]) and other lack of it (Holtz-Eakin [19] , Garcia Mila et al. [15]).

Second, if better connected within its region, a LLS may exploit its local linkages and enlarge the market for its products. Thus, investment in communication infrastructures might be most effective in regions offering rich economic linkages. We therefore consider the growth rate of public capital, and specifically of transportation and communication infrastructures, as one of the potential determinants of employment growth. The measure we use is the aggregation of several types of infrastructures, whose stock at the regional level has been calculated by Picci and Bonaglia [36]. We construct a measure of total infrastructures[15] by adding the nine different kinds of public capital considered in Picci [35] and Picci and Bonaglia [36]. We also separate transport and communication infrastructures from the rest. We consider the measure at the regional level.

---

[15] The kind of infrastructures considered are: Roads and Airports, Railways, Harbors and Canals, Communication Plants for the "Transport and Communication" infrastructures, while Electrical and Idro-electrical Plants, Public Housing, Hygienic Structures and Other Public Works are Other Infrastructures.

Regioni italiane
da growth rate

0.16 a 0.28 (4)
0.10 a 0.16 (4)
0.09 a 0.10 (4)
0.08 a 0.09 (4)
0.05 a 0.08 (4)
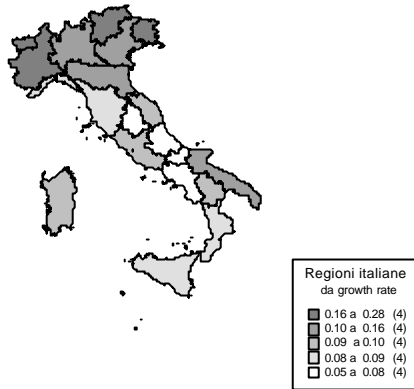
Figure 5: Growth of Transport-Communication Infrastructures in Italian Regions

Interestingly, the growth rate of total (Figure 4) as well as communication and transport (Figure 5) infrastructures in the 1981-1996 period has been larger in the Northern regions (with a small advantage of the Northeast: +1.34 % a year over the Northwest's +1.10%) than in the Southern regions (where the Southwest+islands have had the lowest growth: +0.68%). Creation of infrastructures has not therefore worked in favor of less developed areas, but has privileged already advanced regions.

4.2   Agglomeration Economies

The economic geography literature suggests that various kinds of production externalities may increase the productivity of local industries.[16] These externalities, which can induce differences in wages across countries (as in Krugman and Venables [21]), induce differences in employment density across regions, instead, if wages are equalized by national institutions. Building on this insight we look into the effect of agglomeration economies in determining differences in job creation. Following Marshall [29] and Dumais et al. [10], we identify and measure three kinds of local determinants of agglomeration externalities that should induce firms to locate in one place (i.e. to create jobs in one LLS): Backward and forward linkages, labor pooling externalities, and technological spillovers. We consider local characteristics at the beginning of the period as the pre-determined variables which affect the intensity of externalities and long-run labor demand during the period. Positive agglomeration externalities generate

---

[16] See Fujita et al. [14].

productive advantages for some industries in a location inducing the creation of a larger number of jobs.

4.2.1 Backward and Forward Linkages

The first reason to have agglomeration economies in a location is the presence of potential suppliers and customers. Locating near potential customers and suppliers reduces transportation and information costs, and therefore increases the productivity of factors (labor) in that sector. For each industry z in location r we construct a measure of the fraction of national potential suppliers and customers that are located in the area. This measure captures the potential intensity of linkages (and of their pecuniary externalities) of industry z in region r. The index constructed for the backward linkages is:

$$Input_{zr} = \sum_{j \neq z} I_{jz} \frac{l_{jr}}{l_j},$$

(6)

where I_{jz} is the share of industry z's inputs coming from industry j, while l_{jr} is the total employment of industry j in region r and l_j is total employment of industry j nationwide. The input coefficient I_{jz} is taken from the national Input-Output matrix; the above index is 0 if no potential supplier is located in the same region, and 1 if all of them are.

The index that captures forward linkages is defined as follows:

$$Output_{zr} = \sum_{j \neq z} O_{jz} \frac{l_{jr}}{l_j},$$

(7)

where the O_{jz} is the share of industry z's output going to industry j, taken from the national input-output matrix. These two indices should affect the employment growth of an industry in one location positively. They are constructed including not only the industries in the same LLS as potential suppliers and customers, but all the industries in the region. This implies that we consider the region around an LLS as its natural local market[17] and that, for each industry, all LLS's in the same region have the same input and output linkages. Moreover, as these two indices are rather collinear, in our regressions we include $In\&Out$ which is the average of the two indices (rather than each one separately), to capture input-output linkages together.

---

[17] A more accurate procedure to measure "local market" linkages would be to include industries in LLS within a certain radius from the LLS considered, rather than those in the same region. We have not implemented this measure, as it implies very cumbersome code-writing.

4.2.2 Labor Market Pooling

A second reason for agglomeration externalities is known as labor market pooling. Workers with certain skills are more willing to move to a local labor market where a large number of firms demanding these skills is located; this offers them some insurance in case of dismissal, and also more bargaining power after having acquired some specific human capital.[18] Reciprocally, firms will be willing to locate in areas where they can find a set of workers' skills similar to the one they prefer, because during booms they may hire more of the local workers. Therefore firms will create more jobs in locations whose skill composition is similar to their preferred one. The index of labor pool similarity for industry z in LLS i is:

$$ LabMix_{zi} = -\sum_{o} \left(l_{zo} - \sum_{j \neq z} \frac{l_{ji}}{l_i} l_{jo} \right)^2 , \tag{8} $$

where l_{zo} is the share of workers in occupation (skill)[19] o in sector z, measured nationwide. The summation in brackets reconstructs the potential local pool of workers by occupations (skills), inferring them from the sector composition of the LLS and attributing to each local industry the national composition by occupation of that industry. The index is a "distance index" between the national average skill-composition of an industry (which we assume to be its preferred skilled composition) and the local skill composition, inferred from the local industrial mix. As we take it with a minus sign we expect an increase in this index to reflect larger externalities from labor pooling for a local industry, and therefore a stronger potential for labor creation.

4.2.3 Technological Spillovers

Geographical proximity may generate technological spillovers. These spillovers are the benefits accruing to a firm because knowledge spreads more easily in the local environment and firms may have an advantage in imitating or following the procedures of their neighbors. These spillovers would be maximized by proximity with industries that generate a large amount of useful flow of knowledge. The index we construct is based on a technological input-output matrix, estimated by Scherer [38].[20] Using data on patents, Scherer assesses the amount of technological production of a sector that benefits another sector. In particular, the "source" sector is identified as the sector which has spent R&D resources

---

[18] See Dumais et al. [10] for references.

[19] The occupations defined in the 1981 census are 12, while in 1991 and 1996 they are 9. These occupation are such as: "clerical worker", "generic blue collar", "specialized blue collar", "technician", "business administrator" and so on.

[20] The matrix is estimated using data for the US in the 80's, and it is still the most systematic and serious work in estimating inter-sectoral technological flows.

to lead to the innovation, while the "receiver" sector is identified as the sector using the innovation generated by this R&D.

The nature of inter-industry spillovers may be different across countries and periods. Therefore this measure is at best a proxy of the local technological spillovers in Italian local labor systems, given that it has been calculated using US input-output technological flows. Nevertheless, if those estimates capture some general features of the inter-sectorial spillovers flow, this index conveys some information on potential local spillovers of knowledge. The index for industry z in LLS i is:

$$Techflow_{iz} = \sum_{j \neq z} T_{jz} \frac{l_{ji}}{l_j},$$ (9)

where T_{jz} are the shares of innovative R&D flowing to industry z from industry j estimated by Scherer [38], while the other variables are defined exactly as in formulas 6 and 7. The only difference is that we now consider only firms within the same LLS, as we believe that the most relevant technological spillovers take place via personal interactions and therefore they remain very localized.

Given their definition, if these externalities are at work in determining the productivity of a geographical unit, the indices described above should have a positive effect on employment growth. A further caveat is needed. Given that sectors which have input-output linkages or use similar skills of workers are also very likely to have intense knowledge exchange, the two indices $In\&Out$ and $LabMix$ could very well capture part of the knowledge spillovers across firms. As long as knowledge flows are highly correlated with input-output flows and workers' similarities of skills, it is hard to isolate their effect from that of other local agglomeration externalities.

4.3   Social-Human Environment

Recent developments in the growth literature emphasize the role of social variables (e.g., the protection of law, the quality of institutions, the absence of crime, the literacy rate and interpersonal trust) as important factors in enhancing the level of productivity across countries (Barro [3], Barro and Sala i Martin [5], Knack and Keefer[20] among others). In the same spirit, we include some of these variables as correlates of labor creation. Following Forni and Paba ??, we update their province-level measures and consider only those indicators that have been found to be statistically significant in at least one of their specifications. Thus, we include $Illiteracy$, (number of illiterate over total population), $Turnout74$ (the turnout at the 1974 Referendum), $Conflict$ (hours lost per employee due to labor conflicts) and $Murders$ (the density of murders) all measured in the proximity of the year 1981. The first variable proxies for human capital. The second variable captures citizens' participation in public life, assuming, as Putnam [37] does, that the participation to the Referendum vote on

Figure 6: Murders per person in 1985

Divorce, held in 1974, is a good proxy for this variable. The third and fourth variables capture the level of social and criminal unrest in the province. Forni and Paba [13] show that in the period 1971-1991 the first, third and fourth variables had a negative and significant effect either on employment or on per capita output growth, while the second had a positive effect on them.

The distribution of the variable $Murders$ for the year 1985[21] is shown in figure 6. The distribution of the other social variables is shown in Appendix .1. It is clear for the variable $Murders$, and certainly for $Illiteracy$ and $Turnout74$, that there is a geographical gradient. The highest values are reached in the Southwest and Islands, while the lowest are generally in the Center and the Northeast. There is, nevertheless, also a large "within-region" variation.

Finally, we include as a covariate a dummy $"Industrial\ District"$, whose value is one for those local labor systems defined as "industrial districts" according to the definition in Sforzi [39], adopted by ISTAT [27]. As the definition of industrial district is based on their specialization in some manufacturing sectors, and not on their performance, the criterion of this definition should not be endogenous to employment growth. The local labor systems defined as "industrial districts" could have social-economic characteristics which make them different from the rest, for the important role of social networks and linkages existing in them (see, for example, Becattini [6] and several contributions in the recent monograph Signorini [40]).

---

[21] This is the closest year to 1981, for which we have found data, as the publication at the province level were interrupted in 1975, and resumed only in the late 80's.

22

5 Job Creation and its Covariates

The basic equation that we estimate in this section is derived from Equation 5. For each variable, measured at the LLS/industry level, we take its difference with the national average for that industry (cleaning the industry-specific term α_z), and then we average these differences over the 47 industries in each LLS, weighting each variable by the share of that industry in the LLS. In so doing we are estimating the effects of the covariates on the average employment, imposing identical coefficients in different sectors. This allows us to focus on the geographical, rather than the sectorial, distribution of job creation. The estimating equation is as follows:

$$\overline{g_{t_0 t_1}(l_i)} = a + \beta_1 \overline{\log(l_i)}_{t_o} + \beta_2(g_{t_0 t_1}(G_r)) + \beta_3 \overline{(In\&out_r)}_{t_o} + \qquad (10)$$
$$+ \beta_4 \overline{(LabMix_i)}_{t_o} + + \beta_5 \overline{(TechFlow_i)}_{t_o} + \beta_6(Social\ Variables_p)_{t_0} + u_i$$

where $g_{t_0 t_1}$ indicates the yearly average growth rate between $t_0 (= 1981)$ and $t_1 (= 1996)$. The variables with an upper bar have been taken in differences from the national sector average and then averaged within the LLS. The index i denotes LLS's and varies between 1 and 784. The variables with an r subscript are measured at the regional level; those with a p subscript are measured at the province level. $g_{t_0 t_1}(G_r)$ is the growth in public infrastructures described in Section 4.1. Initial employment per unit of area l_i, the initial value of $LabMix$ (Equation 8), and the initial value of $TechFlow$ (Equation 9) are measured at the LLS level. The initial value of $In\&Out$, obtained averaging 6 and 7, varies only across regions because we consider the whole region as the potential market for a LLS/Industry. The measures of several different variables ($Social\ Variables_p$) described in Section 4.3 , capturing the social environment at the beginning of the period, are measured at the province level. Finally u_i is an i.i.d. error with zero mean.

We use FGLS to estimate equation 10, so as to correct for heteroskedasticity due to differences in the size of LLS's. We compute robust standard errors, to correct for clustering of independent variables. The likely existence of spatial correlation of the residuals, which would make our estimates inefficient, yet consistent and unbiased, is not a source of major concern due to the large number of observations, which ensures rather small standard errors. The results of the regressions are summarized in tables, 3 and 4. In order to interpret the magnitude of the estimated coefficients more easily we have standardized all variables. Employment density (in log) the indices $In\&Out$, $LabMix$, $TechFlow$ and the social variables $Murder$, $Conflict$, $Turnout74$, and $Illiteracy$ have been divided by their standard deviations, while the growth rates (both of the employment and of infrastructures) are expressed in yearly percentage values. Thus, the coefficients we report in Table 3 and 4 are "elasticities" (for the growth of public infrastructures) and quasi-elasticities (for the other variables). They express

the percentage change of the dependent variable in response to a change in one standard deviation of the independent variables.

TABLE 3 JOB CREATION: DETERMINANTS

Specification	I	II	III	IV	V
$\overline{\log(l_i)}$	−0.47*	−0.47*	−0.42*	−0.47*	−0.45*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
$\overline{In\&out_r}$	0.23*	0.17*	0.19*	0.19*	0.18*
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)
$\overline{LabMix_i}$	0.11*	0.08*	0.09*	0.08∗	0.08*
	(0.05)	(0.04)	(0.04)	(0.04)	0.04
$\overline{TechFlow_i}$	0.012*	0.013	0.010	0.01	0.01
	(0.006)	(0.007)	(0.008)	(0.01)	(0.01)
$Illiteracy_p$		−0.13*			
		(0.06)			
$Murders_p$			−0.30*		
			(0.06)		
$Conflicts_p$			−0.15*		
			(0.03)		
$Turnout_p\,74$				0.115	
				(0.06)	
$g_{t_0 t_1}(G_r)$					0.27*
					(0.06)
Obs.	784	784	784	784	784
R^2	0.31	0.33	0.35	0.32	0.33

Dependent Variable: $g_{t_0 t_1}(l_i)$
Robust Std. Errors in Parenthesis, *= Significant at 5% level

Table 3 analyzes first the "local agglomeration" determinants of employment growth. The indices of these agglomeration economies change slowly and are exogenous to the employment decision of a single sector/LLS, which is too small to affect them. Therefore we consider them as predetermined factors and measure them at the beginning of the period (1981). Specification I considers only the three indices of marshallian economies, as determinants of BGP distribution of employment, and controls for the initial distribution of employment density. In specification II, III, IV and V we include, one by one, the socio-human factors, and the different growth rates of public infrastructures, to capture their partial correlation to job creation and their contribution to explain overall variation of that variable.

Specification I produces three important results. First, all the agglomeration variables have a positive and statistically significant coefficient, which is also quantitatively relevant for $\overline{In\&out}$ and $\overline{LabMix}$. A difference of two standard deviations in the index $\overline{In\&out}$ would induce a difference in yearly growth rate of employment equal to 0.46%, which is equal to two thirds of the overall top-

bottom difference in job creation across LLS.[22] Second, the initial level $\overline{\log(l_i)}$ also enters with a negative and very significant coefficient. This implies that the "convergence" specification we have chosen is appropriate, and even without further variables it explains about one third of the variation of employment growth across LLS. Third, the variable $\overline{TechFlow_i}$, although statistically significant in this and some other specifications, is quantitatively extremely small and not important in explaining the variance of job creation. Given that we have derived this measures of technological spillovers from a US-based matrix of flows, and that the other two indices might also be capturing knowledge spillovers across firms, we are not too surprised by such a small residual effect.

Specifications II, III, IV and V include socio-human indices and the growth of infrastructure one by one. As a general remark, all these variables enter with a coefficient of the expected sign and statistically significant (or close to significance). We comment shortly here on each of them. Specification II includes the illiteracy rate in the province ($Illiteracy_p$) in 1981. This variable captures the level of local human capital as well as the quality of social environment, as more educated citizens provide better local institutions and better services. Probably the index is a better measure of the second aspect than of the first, since it loses significance when included with other indicators of the social environment ($Murders_p$, $Conflicts_p$).

Specification III includes two important variables capturing the presence of criminal activity and of social unrest in the area $Murders_p$ and $Conflicts_p$. Both variables have a negative and very significant effect, and also when included with other covariates (as we will do in Table 4) they remain very significant. It is a shared perception, confirmed by formal analysis (as Forni and Paba [13]), that the presence of organized crime has been a major hurdle for growth in some southern provinces. Here we see that it has also been a major deterrent in the creation of jobs. In particular, the estimated coefficient associated with the variable $Murders$ implies that, as a consequence of criminal activity only, job creation has been 1.2% a year lower in the most intensely hit province (Reggio Calabria) than in the least (Pordenone, Chieti, Grosseto, Macerata, Gorizia, and Sondrio, all with 0 murders).

Specification IV includes the measure of turnout in 1974 Referendum vote ($Turnout74$). This should proxy for social involvement of citizens in the local community and therefore for the so-called "social capital" (as argued in Putnam [37]). Its effect, almost significant when included alone, is not very robust, though, to the inclusion of the other measures. Finally specification V includes the regional growth rates of public infrastructures, $g_{t_0 t_1}(G_r)$. The estimated coefficient is statistically very significant and large, confirming the important role of infrastructure growth in helping local productivity growth as found in Picci [35].

---

[22] Once we have cleaned for the industry effects.

Table 4 Job Creation: Further Specifications

Specification	I	II	III	IV
$\overline{\log(l_i)}$	−0.40*	−0.34*	−0.40*	−0.39*
	(0.04)	(0.04)	(0.04)	(0.04)
$g_{t_0 t_1}(G_r)$	0.25*	0.32*	0.25*	0.24*
	(0.07)	(0.07)	(0.10)	(0.12)
$g_{t_0 t_1}(G_r) - Non\ Transport-$			−0.04	−0.04
			(0.07)	(0.08)
$\overline{In\&out_i}$	0.15*	0.10*	0.16*	0.13*
	(0.05)	(0.05)	(0.05)	(0.07)
$[g_{t_0 t_1}(G_r)] * [\overline{In\&out_i}]$				0.52*
				(0.17)
$\overline{LabMix_i}$	0.10*	0.12	0.10*	0.10*
	(0.05)	(0.07)	(0.05)	(0.05)
$\overline{TechFlow_i}$	0.007	0.02*	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)
$Illiteracy_p$	−0.05	−0.07	−0.05	−0.04
	(0.10)	(0.10)	(0.10)	(0.10)
$Murders_p$	−0.23*	−0.25*	−0.21*	−0.21*
	(0.07)	(0.07)	(0.07)	(0.07)
$Conflicts_p$	−0.17*	−0.12*	−0.20*	−0.19*
	(0.04)	(0.04)	(0.04)	(0.04)
$Turnout_p\ 74$	0.15	0.07	0.18*	0.19*
	(0.10)	(0.10)	(0.09)	(0.09)
$Industrial\ District_i$		1.03*		
		(0.10)		
Obs.	784	784	784	784
R^2	0.37	0.46	0.38	0.38

Dependent Variable: $g_{t_0 t_1}(l_i)$
Robust Std. Errors in Parenthesis, * = Significant at 5% level

Table 4 reports four specifications which include all the variables, geographical as well as social and human, which we included one by one in Table 3. Column I shows the basic specification including these variables. The estimates confirm that the coefficients on $In\&Out$ and $LabMix$ are large and significant. Among the socio-human indices, those consistently significant are $Murders$ and $Conflicts$. $Turnout_p$ 74 is always at least close to significance. $In\&Out$ and $LabMix$ are capturing important characteristics of local linkages and labor pooling. As noted before, however, they might be also measuring relevant knowledge spillovers that may be ill-captures by $TechFlow$. This is particularly true in a productive environment, such as the italian one, in which informal interactions among small producers might be important and related to the flow of intermediates and to the sharing of the labor force.

Specification II introduces a dummy capturing those LLS which are classified as $Industrial\ District_i$ (ID from now on). The coefficient on this variable is large and very significant. When included, the significance of the coefficients on

$In\&Out$ and $LabMix$ is reduced. This means that the values of the agglomeration economies vary widely between ID and non-ID areas, and this variation is important in identifying their coefficients. On the other hand those LLS classified as ID seem to have some other "advantage" in generating jobs not captured by our measures.[23]

The last two specifications of table 4 (III and IV) consider the role of infrastructure growth in greater detail. As we claimed that transport and communication infrastructure could have a prominent role in generating jobs, we split the growth of infrastructures in Transport and non-Transport ones, as defined in section 4.1. Remarkably the growth of transport infrastructure is the only part positively and significantly correlated with employment growth. Moreover, when we interact the growth rate of transport infrastructures with the coefficient $In\&Out$ (specification IV), we find a positive coefficient.[24] This suggests that regions that are abundant in potential suppliers and customers benefit more from having better internal connections. This effect has been modeled and pointed out by several recent models of economic geography (for example, Martin [30]), and we find positive evidence of it for the Italian case. This unequal effect could imply that improving transport infrastructure would benefit developed regions more than less developed ones.

Overall, the regression analysis confirms the important positive effect of local agglomerations and of some social variables, such as the absence of crime and of conflicts, on long run employment and, therefore, once we control for the initial conditions, on its growth. The included covariates explain between 40 and 50% of the overall variance across LLS's.

6   Perspectives for Job-Creation

In order to represent the current geography of "job creation potential" implied by the estimated coefficients, we update to 1996 the measures of the predetermined variables; using the coefficients estimated in specification II table 4, we calculate the "predicted job creation" in Italian LLS. As before, we consider the measured characteristics of LLS (density, input-output linkages, labor market mix, technological linkages, murder rates and labor conflicts) in 1996 as predetermined variables for the following period. These characteristics should affect job creation in the following fifteen years just as they did in the previous fifteen.

To be more precise, the evolution of employment growth in the years following 1996 will depend on two factors, assuming a common growth of wages.[25] First the BGP growth of technology and infrastructures, second the dynamics of convergence towards the steady state. Given that we can only measure the

---

[23] A large literature on ID claims that there are some special features of those areas that make them even stronger engines of job creation, such as network connections, informal interactions and so on.

[24] The variable has been divided by its standard deviation.

[25] Certainly introducing differential wage dynamics, if decentralized labor bargaining will be pursued, would add a further determinant to relative employment growth.
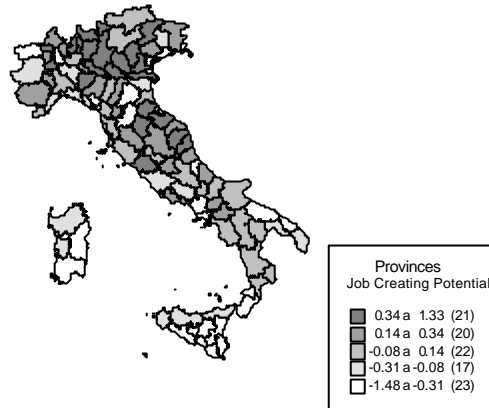
Figure 7: Job creating Potential, estimated in 1996

"slowly changing" exogenous variables in year 1996, and the employment density in that year, we can assess, using the estimated coefficient, the creation of employment driven by the convergence to BGP. Assuming common technological and infrastructure growth, this exercise is informative about the relative growth rate of employment, as implied by the relative BGP level and the relative current level of employment in LLS's. Therefore the differences from the mean (which we set to 0) will be the measure reported. As we have the updated data (ISTAT [25] and ISTAT [26]), we measure $\log(l_i)$, $In\&Out$, $LabMix$, $TechFlow$, $Murders$ and $Conflicts$ for each LLS or province in year 1996 in the same way as we did for year 1981.[26] We also include the $Industrial\ District_i$ dummy and the variable $Turnout_p$ 74. Given the estimated impact of all these variables, we can assess the relative potential for job creation across LLS for the next decade, assuming equal technological growth and equal growth of infrastructures across regions.

   An effective way of summarizing the data consists in reporting this index of "job creation potential" on a map (Figures 7 and 8), averaging LLS's across provinces[27] and reporting this average province potential, indicating higher potentials with darker colors. If we standardize the average to 0, potential job creation ranges from -2.13% to 1.54% a year, with a standard deviation of 0.63% .

   Inspecting the map, we find two areas where strong potentials are concentrated: Eastern Lombardia plus Veneto-Friuli, and the area of Marche, part

---

[26] We do not have updated data for $Illiteracy_p$ whose coefficient was not significnat in any specification. We do not include the variable in the exercise.

[27] Since many LLS's cross provincial borders, we have assigned one LLS to the province in which it has its largest part of employment.
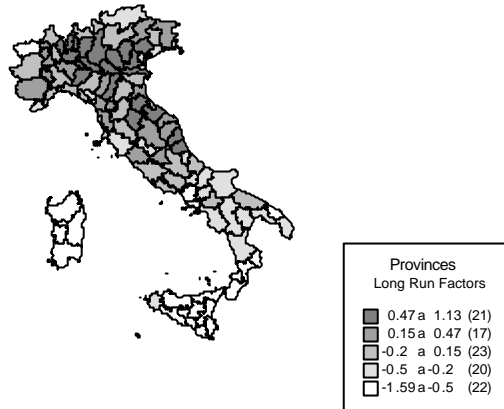
Figure 8: Job Creating potential in 1996: long-run determinants only

of Romagna and some provinces in Abruzzo. The Northwest does not show very strong potentials, while the Southwest and islands look rather poor, although not terribly so. The "convergence coefficient" plays an important role, raising the predicted performance of Calabria, while harming dense cities such as Milano, Firenze, Bologna, and Venezia. Higher density of initial employment penalizes job creation (and rather heavily given the estimates of -0.34% from specification II in Table 4). Nevertheless, different performances in the South, where Abruzzo, Molise and Northern Campania show better potential than Southern Calabria, Sicilia and Sardegna, depend crucially on local characteristics.

It could be useful, therefore, to show a map with differences in employment potential due only to agglomeration characteristics ($In\&Out$, $LabMix$ and $TechFlow$) and "social characteristics" ($Murders$, $Conflicts$, $Turnout_p$ 74 and $Industrial\ Districts$), leaving out the initial density effect. Figure 8 shows the differential of job creation potential predicted using only the long-run determinants of job creation, measured in 1996, multiplied by the coefficients estimated in specification II (Table 4).

The advantage of the Center-Northeast, and the disadvantage of the Southwest is even more remarkable in this picture. Local linkages, labor markets and technological flows benefit the Northeast (mostly Lombardy and Veneto) and Latium (because of Rome as a local market), while the social variables are best in the Northeast and in the central area of Marche. Putting together these effects (Figure 8), we observe the best job potential (net of initial density) in the Northeast, while in the South the best perspectives are for the Abruzzo and some provinces in Northern Campania and possibly Puglia. Calabria and the

Islands show the direst job potential perspectives[28].

Reading the exercise with a grain of salt we notice the following three points:

- The Northeast still appears the most promising area, partly because of its local characteristics, social environment and economic linkages, and partly because it is still less densely populated than the Northwest.

- The Southeast, in particular Southern Abruzzo and some provinces in northern Campania and Puglia, is the most promising area in the South. These areas combine good local market characteristics, better social variables, proximity to Rome, and a gap with the North that makes them ready for "take-off."

- The Southwest, in particular Calabria and Sicilia, has got mostly "non-exploited opportunities" in their recent past. Still lagging behind in terms of local economic network, very much penalized by high crime rates and also recently penalized by the slowdown in public investments, they have a large gap to fill.

7   Conclusions

The present work has undertaken the task of carefully measuring job creation and some important covariates in Italian Local Labor Systems, providing an explanation of their performance in the 1981-1996 period and an assessment of their future perspectives. In a simple framework, inspired by the so called "convergence literature" we analyze determinants of job creation such as local agglomeration economies, social and human environment and regional infrastructure improvements. To our knowledge, this is the first work to test the role of agglomeration economies as determinants of job creation (and therefore as determinants of the economic geography of a country) after controlling for several other local variables. Backward and forward linkages appear as the most important local mechanism in generating agglomeration economies and employment growth. Given that these forces have been the most intensely studied by the recent theories of economic geography,[29] the paper provides empirical support to the focus of that literature.

More generally, the paper contributes to the understanding of Italian regional (and local) economic disparities. In the last two decades, regional divergence in growth rates of GDP per capita in Italy has been due to differences in the evolution of the employment/population ratio, rather than to differences in productivity growth. Successful LLS have been able to "put at work" a larger fraction of their population. This has been largely driven by local characteristics promoting competitiveness. This local advantage is the main determinant of long-run growth in income and employment in a geographic unit, be it a region or a LLS.

---

[28] Potential for job creation in each LLS is available from the authors upon request.

[29] See Fujita et al. [14] for an overview.

Borrowing from economic geography and growth theories we have identified and measured some of the variables regarded as long-run catalysts of development, and we have estimated their partial correlation with job creation. Economic policies aiming at influencing long-run growth and at balancing regional disparities must seriously consider the local structural factors that we have analyzed. In particular, while not being an arrival point, the present analysis shows a way in assessing the impact of local characteristics on job creation.

References

[1] Aschauer D. (1989): "Is Public Expenditure Productive?" *Journal Of Monetary Economics*, vol 23, pp. 177-200.

[2] Banca d'Italia (2000): "Relazione Annuale sul 1999", Sezione Relazione Economica: Reddito, Prezzi e Bilancia dei Pagamenti, pag. 111. May 2000

[3] Barro R.J. (1997): *Determinants of Economic Growth: A Cross-Country Empirical Study*, MIT Press, Cambridge Ma.

[4] Barro R.J. and X. Sala i Martin (1991): "Convergence across States and Regions," *Brooking Papers on Economic Activity* no1, 107-182.

[5] Barro R.J. and X. Sala i Martin (1999): *Economic Growth*, MIT Press, Cambridge, Ma.

[6] Becattini, G. (1987): *Mercato e Forze Locali: Il Distritto Industriale* Bologna, Il Mulino.

[7] Becattini, G. (1990): "The Marshallian Industrial District as Socio-Economic Notion," in *Industrial Districts and Inter-Firm Cooperation in Italy* - edited Pyke, Becattini and Sengenberger Geneva IILS.

[8] Casavola, P. and P. Sestito (2000): "Politiche di Sviluppo e Politiche del Lavoro: Che Sta Succedendo nel Mezzogiorno?" Manuscript, Sep. 2000, Ministero del Tesoro.

[9] Casavola, P.A. Gavosto and P. Sestito (1995): "Salari e Mercato del Lavoro Locale," *Lavoro e Relazioni Industriali* n.4 pp. 40-95.

[10] Dumais, G., G. Ellison and E.L. Glaeser (1997): "Geographic Concentration as a Dynamic Process," *NBER Working Paper # 6270*.

[11] European Commission (1999): "Italy's Slow Growth in the '90's" *Reports and Studies*, No 5.

[12] Ferrero, M. and D. Invernizzi(1992): "La Struttura Retributiva dei Lavoratori alle Dipendenze: Evidenza Empirica dagli Osservatori INPS," *Economia e Lavoro* n.1 pp. 95-116.

[13] Forni, M. and S. Paba (2000): "The Sources of Local Growth: Evidence from Italy," *Giornale degli Economisti e Annali di Economia* 59- N.1, pp.1-49

[14] Fujita, M., P. Krugman and A.J. Venables (1999): *The Spatial Economy*, MIT Press, Cambridge, London 1999.

[15] Garcia Mila T., T. McGuire and R.Porter (1996): "The Effect of Public Capital in State-Level Production Function Reconsidered," *The Review of Economics and Statistics* pp.177-180.

[16] Garibaldi, P. and P. Mauro (1999): "Deconstructing Job Creation" IMF manuscript.

[17] Ginzburg, A., M. Scaltriti, G. Solinas and Rossella Zoboli (1998): "Un Nuovo Autunno Caldo nel Mezzogiorno? Note in Margine al Dibattito sui Differenziali Salariali Territoriali," *Politica Economica*, XIV.

[18] Helg, R. Peri G. and Viesti G. (2000): "Abruzzo and Sicily: Catching Up and Lagging Behind," in *European Investment Bank Papers* Vol. 5 No 1.

[19] Holtz-Eackin D. (1994): "Public Sector Capital and the Productivity Puzzle," *The Review of Economics and Statistics*, vol 76 pp.12-21.

[20] Knack, S. and P. Keefer (1997): "Does Social Capital Have an Economic Pay-Off? A Cross-Country Investigation," *Quarterly Journal of Economics* 112: 1251-1288.

[21] Krugman, P. and A. Venables (1995): "Globalization and the Inequality of Nations," *Quarterly Journal of Economics*, 110(4) 857-880.

[22] ISTAT (1981): "Censimento dell'Industria e dei Servizi," Istituto Nazionale di Statistica, Roma 1981.

[23] ISTAT (1981): "Censimento della Popolazione," Istituto Nazionale di Statistica, Roma 1981.

[24] ISTAT (1991): "Censimento dell'Industria e dei Servizi," Istituto Nazionale di Statistica, Roma.

[25] ISTAT (1996): "Censimento intermedio dell'Industria e dei Servizi," Istituto Nazionale di Statistica, Roma.

[26] ISTAT (1997) "Cause di Morte," Istituto Nazionale di Statistica, Roma.

[27] ISTAT (1999): "I Sistemi Locali del Lavoro," Pubblicazione dell'Istituto Nazionale di Statistica, Roma.

[28] Marimón, R. and F. Zilibotti (1998): "Actual versus Virtual Employment in Europe: Is Spain Different?" *European Economic Review* 42 (1998) 123-153.

[29] Marshall, A. (1920): *Principles of Economics*, London, Macmillan.

[30] Martin P. (1998): "Public Policies, Regional Inequalities and Growth" *CEPR Discussion Paper* N. 1841.

[31] Paci, R. and F.Pigliaru (????): "Differenziali di Crescita nelle Regioni Italiane: Un'Analisi Cross Section," *Rivista di Politica Economica* vol 85 3-34.

[32] Paci, R. and F.Pigliaru (1997): "Structural Change and Convergence: an Italian Regional Perspective," in *Structural Change and Economic Dynamics* vol 8: 297-318.

[33] Paci, R. and A. Saba (1997): "The Empirics of Regional Economic Growth in Italy 1951-1993," *Contributi di Ricerca Crenos*, 97/1.

[34] Peri G. and A. Cunat (2000) "Job Creation in Italy: Geography, Determinants and Perspectives," *IGIER Working Paper*.

[35] Picci, L. (1999): "Productivity and Infrastructure in the Italian Regions," *Giornale degli economisti, Annali di Economia* Vol. 58 N. 3-4 pp.329-353.

[36] Picci, L. and F. Bonaglia (1999): "Il Capitale nelle Regioni Italiane," WP. n. 374 DSE, University of Bologna.

[37] Putnam, R.D., R. Leonardi and R.Y. Nanetti (1994): *Making Democracy Work. Civic Traditions in Modern Italy*, Princeton University Press.

[38] Scherer, F. (1984): "Using Linked Patent Data and R&D Data to Measure Technology Flows," in Griliches (ed.) *R&D Patents and Productivity*, The University of Chicago Press.

[39] Sforzi, F. (1990); "The Quantitative Importance of Marshallian Industrial Districts in the Italian Economy," in *Industrial Districts and Inter-Firm Cooperation in Italy*, ed. by F.Pyke- G.Becattini -W.Segenberger, Geneva International Institute for Labour Studies.

[40] Signorini F. (2000) *"Lo Sviluppo Locale"* Meridiana Libri, Donzelli Editore, Roma.

[41] Temple, J. and P.A. Johnson (1998): "Social Capability and Economic Growth," *Quarterly Journal of Economics* vol. 113 pag 965-990.

Illiteracy rate 1981

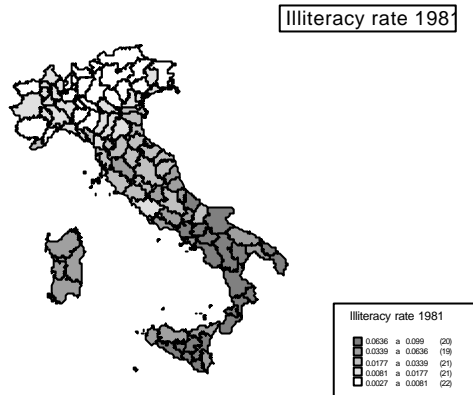|		
0.0636 a 0.099	(20)	
0.0339 a 0.0636	(19)	
0.0177 a 0.0339	(21)	
0.0081 a 0.0177	(21)	
0.0027 a 0.0081	(22)	

Figure 9: Illiteracy Rate in 1981

Appendix: Geographic Distribution of the Social Variables

The following Figures describe the distribution by province of the remaining three variables capturing the local social environment. Figure 9 displays the illiteracy rate ($Illiteracy$), calculated as the number of illiterate over the total of the population for year 1981 (The source is ISTAT [23]).The highest rates are found in the Southwest and islands, decreasing towards the North, with the lowest rates reached in the Northeast. Symmetric behavior is exhibited by the variable $Turnout74$ in Figure 10, which measures the percentage of voting population at the Referendum in 1974. Since the study of Putnam [37], this measure has been considered as a proxy for the civic involvement of people and for their participation to public life. The areas of highest participation are the Center and the Northeast, while the Southwest has very low values. Finally, the measure of labor conflicts ($Conflicts$) represents the average number of hours per person lost due to labor conflicts in 1981. The geographic distribution of this variable, shown in Figure 11, is actually more uneven than for the others. Its correlation with the values in 1971, used by Forni and Paba[13], is also rather low (0.27).

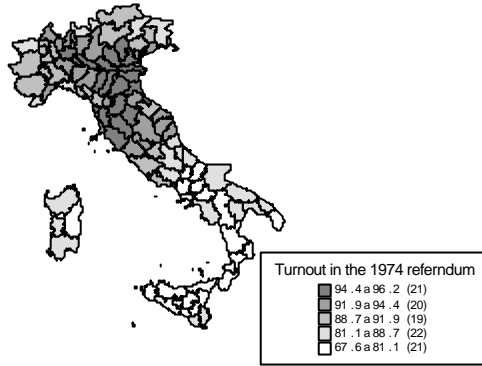Electoral Turnout Referendum 1974

Turnout in the 1974 referndum
- 94.4 a 96.2 (21)
- 91.9 a 94.4 (20)
- 88.7 a 91.9 (19)
- 81.1 a 88.7 (22)
- 67.6 a 81.1 (21)

Figure 10: Electoral Turnout at the 1974 Referendum

Hours lost for Labor Conflicts 1981

Labor Conflicts 1981
- 0.00215 a 0.00589 (20)
- 0.00137 a 0.00215 (21)
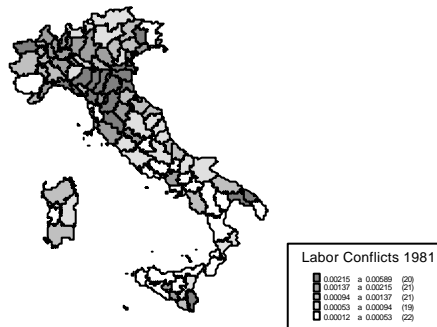- 0.00094 a 0.00137 (21)
- 0.00053 a 0.00094 (19)
- 0.00012 a 0.00053 (22)

Figure 11: Hours per person lost for labor conflicts, 1981