

Caporale, Guglielmo Maria; Di Colli, Stefano; Di Salvo, Roberto; Lopez, Juan Sergio

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## Local banking and local economic growth in Italy: Some panel evidence

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# 1409

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Opinions expressed in this paper are those of the author(s) and do not necessarily reflect views of the institute.

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DIW Berlin  
German Institute for Economic Research  
Mohrenstr. 58  
10117 Berlin

Tel. +49 (30) 897 89-0  
Fax +49 (30) 897 89-200  
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# **Local Banking and Local Economic Growth in Italy: Some Panel Evidence**

**Guglielmo Maria Caporale\***

Brunel University, London, CESifo and DIW Berlin

**Stefano Di Colli**

Federkasse, Rome and John Cabot University

**Roberto Di Salvo**

Federkasse, Rome and Fondo di Garanzia dei Depositanti

**Juan Sergio Lopez**

Federkasse, Rome

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## **Abstract**

This paper provides new evidence on the contribution of local banking to local economic growth (i.e. at county level – the Italian “province”) in Italy. A comprehensive dataset is used, which includes control variables for social capital and human capital as well as indicators of the quality of local infrastructures and the production structure of the local economy. A linear within-estimator technique with fixed effects is applied to a modified version of the so-called Barro regression (Cecchetti and Karrhoubi, 2013) in order to address the well-known econometric issues of reverse causality and estimation bias resulting from unobserved district-specific influences.

**Keywords:** bank lending, local growth, panel data

**JEL classification:** C33, E44, G01, G32.

\*Corresponding author. Research Professor at DIW Berlin.

Email: [Guglielmo-Maria.Caporale@brunel.ac.uk](mailto:Guglielmo-Maria.Caporale@brunel.ac.uk)

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## **1. Introduction**

This paper examines the linkage between local banking activities and local economic growth. It considers issues such as the importance of local banks providing loans to creditworthy borrowers, as well as the quality of local infrastructures and the local production structure. Local banks are typically more focused on strengthening the social capital of the local community where they operate and are characterised by a better knowledge of local economic agents.

The present study is related to two distinct branches of the literature. The first analyses the relationship between financial structure and economic development (see Goldsmith, 1969, and several papers on endogenous economic growth surveyed by Pagano, 1993, and Levine, 1997, 2003). The second investigates the lending behaviour of banks depending on their size, ownership (La Porta et. al., 2002) and organisational structure (Berger and Udell, 2002). We analyse the Italian case at the county level (the Italian “province”) applying panel data methods to a comprehensive data set (with a sub-sample of Cooperative Credit Banks, small local banks that are used as a proxy for local banking) spanning the period from 1998 to 2009. The main findings can be summarised as follows. Italy is still characterised by significant geographical heterogeneity, with convergence still taking place. The quality of human capital (education) and of social capital (volunteering, separate collection of rubbish and recycling) has a positive and statistically significant impact on the local economy; public expenditure has countercyclical effects. Local banking has a positive effect on local growth, especially in Northern Italy, whilst the production structure plays a less important role, although the presence of handicraft firms is usually associated with stronger growth.

The layout of the paper is as follows. Section 2 reviews briefly the relevant literature. Section 3 provides details of the data. Section 4 describes the econometric framework and the main empirical results. Section 5 and 6 focus on the role of local infrastructure and local banking respectively. Section 7 offers some concluding remarks.

## **2. Banking Activity and Growth**

The relationship between the financial sector and, in particular, the banking sector and economic growth has been extensively investigated in the empirical literature in the last twenty years. Initially, the role of financial intermediation, of financial markets and of the competition within the banking sector was analysed; subsequently, the role of the institutional and legislative framework, as well as bank governance, was considered. Overall, the empirical findings have

confirmed that finance and banking activities play a significant role for economic growth, and specifically that a more developed financial sector and higher accessibility to banking services are associated with stronger economic growth (see, e.g., King and Levine, 1993a,b and Rousseau and Wachtel (1995). Barro (1991), King and Levine (1993a, b), and Barro and Sala-I-Martin (1995) introduced indicators of financial sector development which have been widely used in the following literature.

The effects on economic growth of different accounting standards, bankruptcy procedures and models of governance were examined in a well-known contribution by Levine et al. (2000). They reported that, in countries where creditor rights are better guaranteed, accounting standards are more transparent, fines are more strictly applied and the financial intermediaries are more developed, there are better economic perspectives. The relationship between the legal system and economic growth has been examined by La Porta et al. (1998) and Levine (1999, 2002).

Cetorelli and Gambera (2001) analysed the link between economic growth and concentration within the banking sector, and found that a more concentrated banking sector can more easily meet the financing needs of companies by promoting, developing and supporting the creation of new businesses. La Porta et al. (2002) provided evidence that public ownership of commercial banks does not lead to a quick development of the financial system. Wachtel (2001) found that the presence of foreign-owned banks has a positive impact on growth for at least three reasons: it leads to a faster introduction of new banking products and services, it increases economies of scale for the banking sector, and it attracts more foreign direct investment. More recently, Cecchetti and Kharroubi (2012) concluded that there is a threshold beyond which the impact on economic growth of a more developed financial system becomes negative, as further increases in its size (in terms of share of employment) reduce its productivity. Beck et al. (2014) argued that financial intermediation now also includes activities such as trading, consultancy services, market making, insurance, etc.; when these are taken into account there is clear evidence that financial intermediation has a positive effect on economic growth in the long run, and also that it reduces its volatility; by contrast, the size of the financial sector does not seem to play a role. Finally, a recent report by the Advisory Scientific Board of the ESRB, entitled "Is Europe overbanked?" (ESRB, 2014), concludes that the current size of the European banking sector has negative effects on growth because it encourages excessive risk-taking (both at the individual bank and systemic level) in the form of high-risk assets (in real estate etc.)

Concerning Italy in particular, Mattesini and Cosci (1997) showed that the volume of loans granted by local financial intermediaries has a positive impact on local growth. Dalla Pellegrina (2005) also found a positive correlation between economic growth and the presence of financial

intermediaries by looking at different categories of intermediaries: Commercial Banks, Popular Banks and Cooperative Banks (BCCs).

### **3. The data**

Our data set is an unbalanced panel for all the Italian counties over the period from 1998 to 2009. It includes 28 economic, social and credit variables (some of which are available only for sub-samples). A detailed list, including sources and geographical level (county or regional) is provided in Tables 1 and 2 together with some descriptive statistics. The economic variables can be divided respectively into those related to the state of the local economy, the local production structure, the quality of local infrastructure and human and social capital.

Those for the state of the local economy are the following: economic growth (annual change in total value added per capita at county level), initial wealth (the log of the initial income per capita income at county level), the labour market (the unemployment rate and the annual change of the number of employees at county level), inflation (the log of the annual change in the consumer price index at county level), foreign trade (export, import and trade openness given by the sum of export and import divided by the total value added at county level), government expenditure (total government expenditure divided by the total value added at regional level), public and private expenditure on research and development (the ratio of investment on research and development of national and local government and of universities to GDP at the regional level, and the ratio of investment on research and development of public and private firms at the regional level).

The production structure is defined in terms of both the vitality and the degree of risk incurred by the local entrepreneurs. The following variables are included: the rate of net enrolment at the provincial registry of new firms at county level, exports of the sectors for which foreign demand is stronger, the number of new patents at county level registered at the European Patent Office (EPO) during the previous year, the number of firms that failed during the previous year, the new non-performing loans to loans ratio, the share of value added for the main sectors in the economy (agriculture, industry including constructions, services) as well as handicraft firms in total value added.

The state of the local infrastructure is described by the index of freight transport by train at the regional level (inbound and outbound goods moved on the railways by tons per capita during the previous year), the index of freight transport on the road (inbound and outbound goods moved on the road by tons per capita during the previous year), the index of usage of public transport (the percentage of users of public transport in the total number of people who have moved for work and



study reasons during the previous year at the regional level), the attractiveness of the regional hospital services (the percentage of people coming to local hospitals from another region in the total number of people hospitalised at the regional level).

Human capital is measured as the level of education at county level, and social capital as follows: bloodletting (the number of bloodlettings per capita at the regional level), volunteering (the percentage of people aged more than 14 who did voluntary work during the previous year at the regional level), separate collection of rubbish (the percentage in kilograms of the total amount of rubbish at county level), the importance of the cooperative societies (the percentage of the number of employees of cooperatives in the total number of employees at the regional level).

The variables for banking activity are the ratio between banking loans and total value added at county level and the percentage of loans granted by local banks. In particular, the subsample of local banks is given by the Cooperative Credit Banks (BCCs), that are a typical case of small local banks.

#### **4. Econometric Results**

The econometric analysis of the determinants of local growth aims at testing whether there is a causal relationship between the yearly change of total value added per capita and a set of regressors including the variables described above. Our specific interest is to establish the extent to which the banking sector (and the subsample of local banks) contributes to economic growth at county level. It is well known that applying simple linear regression methods to panel data would be inappropriate for at least two reasons. The first is the possibility of reverse causality: a positive link between economic growth and the presence of banks could indicate a role for the banking industry in local economic development, or instead that banks tend to open new branches in areas where the economy is more developed, there is more human and social capital, the local infrastructure is more efficient, and the production structure is characterised by a greater concentration in the sectors with higher growth potential. The second is that the unobservable geographical effects are included in the error term. Therefore, this is correlated to the dependent variable and the regression estimates are biased.

One way to avoid the simultaneity problem is to use the initial value of the independent variables and the total change or the average of the dependent variable over the entire sample period (1998-2009 in our case), moving from a panel data to a cross-section framework. This approach has been applied by Mattesini and Cosci (1997) to data for the Italian banking sector. Levine et al. (2000) suggested using instrumental variables in this context to avoid misspecification problems.

However, Rousseau and Wachtel (2000) argued that both cross-sections with the initial value of the regressors and cross-section or panel data with instrumental variables do not fully solve the simultaneity problem, because the determinants of economic growth tend to be serially correlated. Two other methods have been proposed instead: 1) to specify a dynamic panel equation, by applying panel VAR techniques (Wachtel and Rousseau, 1995, and Rousseau and Wachtel, 1998, among others), or by using the dynamic estimator of Arellano-Bond (Arellano and Bond (1991)) with instrumental variables; 2) to use a modified version of the so-called Barro regression equation. In this framework, economic growth is a function of an autoregressive component, initial income and a vector of economic as well as control variables (e.g., the initial level of banking activity, human and social capital: see Beck and Levine, 2004; Cecchetti and Kharroubi, 2012). The problem associated with the non-observable specific effects at county level could also be solved by using dynamic regression techniques or by simply introducing fixed effects at county level in all the equations, as in Caratelli et al. (2006). However, the collinearity between the fixed effects at county level and economic growth (the dependent variable) may lead to biased estimates. For this reason, this approach should be adopted only if the robustness of the results can be thoroughly checked.

In this study we estimate a modified Barro regression as in Beck and Levine (2004) and Cecchetti and Kharroubi (2012), since dynamic panel approaches require much longer runs of data (see Rousseau and Wachtel, 1995). The equation is specified as follows:

$$\Delta y_{i,t} = \alpha + \beta_1 \Delta y_{i,t} + \beta_2 w_{i,t-1} + \gamma X_{i,t} + \delta_1 b_{i,t} + \delta_2 h_{i,t} + \phi' S_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where  $y_{i,t}$  is the per capita value added at county level,  $w_{i,t}$  is the per capita initial income,  $X_{i,t}$  is a vector of macroeconomic variables at county and regional level,  $b_{i,t}$  is the variable for banking activity (banking loans to value added ratio) at county level,  $h_{i,t}$  is human capital at county level (the percentage of the total number of people aged 14-18 enrolled at secondary schools),  $S_{i,t}$  is a vector of control variables related to the social capital of the  $i$ -th county or corresponding region.

The results are reported in Table 3. The estimated coefficient  $\beta_1$  of the lagged dependent variable is positive and statistically significant, confirming the existence of an autoregressive component for economic growth at county level. By contrast, the coefficient  $\beta_2$  on initial income is negative and statistically significant: consistently with the literature on  $\beta$  convergence (Barro, 1991, Barro and Sala-i-Martin, 1991, 1992a, 1992b, 1992c), it allows us to conclude that there has been economic convergence between rich and poor counties. Furthermore, banking activity, measured by the ratio of banking loans to total value added at county level (as well as the quality of human capital) has a positive effect on economic growth at county level. The estimated  $\delta_1$  and  $\delta_2$  coefficients are also positive and statistically significant.

The basic version of equation (1) was then extended by adding control variables for the state of the local economy and social capital. Table 4 shows the results including employment, inflation, government spending and trade openness: the yearly change in the number of employees and public expenditure appear to have a significant effect on economic growth (positive and negative, respectively). The negative relationship between public expenditure and the annual change in per capita value added can be attributed to the counter-cyclical and redistributive nature of the former. Of the social capital variables, volunteering and separate collection of rubbish are found to have a positive and significant impact on the performance of the local economy.

## 5. Production Environment and Infrastructure

The quality of the production framework and local infrastructure plays a crucial role for local economic growth. The initial state of the production environment (especially for the industrial sector rather than agriculture or services), or the capacity of local entrepreneurs to identify market areas with the highest potential, are positively related to economic growth. Also, an efficient infrastructure can decrease transport costs and improve the quality of life, attracting both financial and human resources.

In order to take into account the state of local infrastructure, equation (1) can be rewritten as follows:

$$\Delta y_{i,t} = \alpha + \beta_1 \Delta y_{i,t} + \beta_2 w_{i,t-1} + \gamma_1 e_{i,t} + \delta_1 b_{i,t} + \delta_2 h_{i,t} + \delta_3 r_{i,t} + \mathcal{G}' I_{i,t} + \eta_i + \varepsilon_{i,t} \quad (2)$$

where  $e_{i,t}$  is the annual change in the number of employees,  $r_{i,t}$  is the separate collection of rubbish,  $I_{i,t}$  is a vector of variables for the quality of local infrastructure: the index of freight transport by train (inbound and outbound goods moved on the railways by tons per capita), the index of freight transport on the road at regional level (inbound and outbound goods moved on the road by tons per 100 people during the previous year), the index of usage of public transport (the percentage of users of public transport of the total number of people who have moved for work and/or study reasons during the previous year at regional level) and the attractiveness of the regional hospital services (the percentage of people coming to local hospitals from another region in the total number of people hospitalised at regional level during the previous year). The estimation results are shown in Table 5. Economic growth is affected positively by freight transports by train (not by freight on the road or the efficiency of public transport)

Equation (3) includes some variables for the local production environment, such as the local entrepreneurship behaviour, the relative weight of the three main sectors (agriculture, industry, services) and of handicraft firms:

$$\Delta y_{i,t} = \alpha + \beta_1 \Delta y_{i,t} + \beta_2 w_{i,t-1} + \gamma_1 e_{i,t} + \delta_1 b_{i,t} + \delta_2 h_{i,t} + \delta_3 r_{i,t} + \omega' P_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3)$$

where  $P_{i,t}$  is a vector of variables including the rate of net enrolment at the provincial registry of new firms at county level (as a proxy for the dynamism of local entrepreneurs), exports of the sectors for which foreign demand is stronger, the number of new patents at county level registered at the European Patent Office (EPO) during the previous year, the number of firms that failed during the previous year, the new non-performing loans to loans ratio (as a proxy for the riskiness of local entrepreneurs), the share of the main economic sectors (agriculture; industry including construction; services) as well as handicraft firms of the total value added.

The results (see Tables 6.a and 6.b) suggest that higher risk-taking of the local entrepreneurs could adversely affect the annual change of total value added at county level, while a production structure more oriented towards the industrial sector and characterised by a strong presence of small enterprises has a positive effect on economic growth (although the coefficients are not always statistically significant).

## 6. Local Banking

Finally, we focus on the contribution of local banks (specifically, Cooperative Credit Banks - BCCs) to economic growth at county level. It is well known from the banking literature that local cooperative banks are characterised by a specific organisational structure and by a different corporate governance model. Further, because of their closer relationship with the local area where they operate, their ability to support the local economy is bigger. As pointed out by Di Salvo and Ferri (1994), by Mattesini and Ferri (1997) and by Cosci and Mattesini (1998), Italian BCCs have three main features: 1) they typically are local banks, strictly related to their specific local area, 2) in terms of size they can generally be considered small banks, 3) being cooperative banks the incentives for their managers significantly differ from those of other banks. For these reasons, they are especially oriented towards stimulating local business, and in particular enterprises that could not raise funding from elsewhere.

The role of local banks can be isolated as in equation (4):

$$\Delta y_{i,t} = \alpha + \beta_1 \Delta y_{i,t} + \beta_2 w_{i,t-1} + \gamma_1 e_{i,t} + \delta_1 b_{i,t} + \delta_2 h_{i,t} + \delta_3 r_{i,t} + \lambda' LB_{i,t} + \rho' LB_{i,t}^2 + \eta_i + \varepsilon_{i,t} \quad (4)$$

where  $LB_{i,t}$  is a vector of loan market shares for local banks in Italy.  $LB_{i,t}$  is also interacted with geographical dummy variables for Northern, Central and Southern Italy (equal to 1 in the counties belonging to each geographical area and 0 otherwise). In addition, a nonlinear specification is chosen to test if local bank activity is associated to growth only for a given market share, i.e. if size matters (in the sense that too small local banks cannot affect economic growth).

Table 7 reports the estimation results, which confirm that the presence of local banks has a positive nonlinear effect on local economic growth, since the squared coefficient on the local bank market shares is positive and statistically significant and has the biggest size. This is particularly true of North-East Italy, whilst in the South and in the Centre the estimated coefficients are not significant at the 5% level.

## 7. Conclusions

This paper contributes to the literature on the relationship between the financial (specifically banking) sector and economic growth by providing some new empirical evidence on their linkages at the local level in Italy. Appropriate econometric techniques dealing with simultaneity issues are applied to a large panel including 28 variables for the local economy, banking loans, social capital, human capital, and the main features of the productive environment over the period 1998 to 2009. The main findings are as follows. Economic convergence (the well-known beta convergence in the Barro regression approach) between rich and poor counties has been taking place in Italy. Economic variables such as employment, the quality of human (education) and social capital (volunteering and recycling) have a positive impact on local economic growth. In particular, human capital (schooling) affects significantly the annual rate of change of economic value added, whilst public expenditure has countercyclical effects. Finally, banking activity is confirmed to be an important factor driving local economic growth, in line with the empirical literature on the relationship between finance and economic growth (Cecchetti and Kharroubi, 2013). Specifically, the presence of local banks is found to have a nonlinear effect on local economic growth: in the counties with a high loan market share the relationship is positive and statistically significant, whilst it is negative in those with a low share, especially in North-East Italy.

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## Tables

**Table 1. Variables' definition**

<b>Variable</b>	<b>Definition</b>	<b>Source</b>	<b>Level</b>	<b>Unit of measur.</b>
<i>Economic growth</i>	Annual change of total value added pc	Istat	County	%
<i>Initial income</i>	Logarithmic transformation of the initial income per capita	Istat	County	%
<i>Human capital</i>	% over the total # of people aged 14-18 enrolled at secondary schools	Istat	Region	%
<i>Unemployment</i>	Unemployment rate	Istat	County	%
<i>Employment</i>	Annual change of the number of employees	Istat	County	%
<i>Inflation</i>	Logarithmic transformation of the annual change in the consumer price index	Istat	County	%
<i>Trade openness</i>	Sum of export and import divided by the total value added	Istat	County	%
<i>Public expenditure</i>	Total government expenditure divided by the total value added at regional level	Istat	Region	%
<i>Public expenditure in R&amp;D</i>	Investments on R&D of national and local government and universities over GDP ratio	Istat	Region	%
<i>Private expenditure in R&amp;D</i>	Investments on R&D of public and private firms over GDP ratio	Istat	Region	%
<i>Firm registry</i>	Rate of net enrollment at the local registry of new firms	Istat	County	%
<i>High potential export</i>	Export in those sectors where foreign demand is stronger	Istat	County	%
<i>Patents</i>	Number of new patents registered at the European Patent Office during last year	Istat	Region	Num
<i>Weight - Agriculture</i>	Weight of the value added of agriculture sector over total value added	Istat	County	%
<i>Weight - Industry</i>	Weight of the value added of industry sector over total value added	Istat	County	%
<i>Weight - Services</i>	Weight of the value added of services sector over total value added	Istat	County	%
<i>Handicraft firms</i>	Weight of the value added from handicraft firms over total value added	Tagliacarne	County	%
<i>Ceased firms</i>	Number of firms failed during last year	Istat	Region	Num
<i>Firm riskiness</i>	New non-performing loans to loans ratio	BdI	Region	%



<i>Railway transports</i>	Inbound and outbound goods moved on the railways in terms of tons per capita	Istat	Region	Index
<i>Transports on the road</i>	Inbound and outbound goods moved on the roads in terms of tons per capita	Istat	Region	Index
<i>Public transports</i>	% over the total # of people who moved for working/studying reasons using public trans.	Istat	Region	%
<i>Hospital attractiveness</i>	% over the total # of people hospitalized coming to local hospitals from another reg.	Istat	Region	%
<i>Bloodlettings</i>	Number of bloodlettings per capita	Avis	Region	%
<i>Volunteering</i>	% of people aged more than 14y who did voluntary work activities during last year	Istat	Region	%
<i>Separate rubbish</i>	% of the total amount of rubbish collected separately (kilograms)	Istat	County	%
<i>Cooperatives</i>	% over the total number of employees of those employed by a cooperative firm	Istat	Region	%
<i>Banking loans</i>	Ratio between banking loans and total value added	BdI - Istat	County	%
<i>BCC market shares</i>	Loan markets shares of BBCs	BdI	County	%

**Table 2. Preliminary statistics**

<b>Variabile</b>	<b># Osser.</b>	<b>Media</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<i>Local economic growth</i>	1,133	0.0324	0.0373	-0.0883	0.3598
<i>Initial income</i>	1,133	1.4507	0.1321	1.0049	1.7133
<i>Unemployment</i>	618	0.0735	0.0430	0.0186	0.2161
<i>Employment</i>	1,133	0.0085	0.0296	-0.3842	0.1141
<i>Inflation</i>	1,030	0.0097	0.0057	-0.0647	0.0846
<i>Trade openness</i>	1,236	0.4024	0.2746	0.0142	2.9090
<i>Public expenditure</i>	1,236	0.2525	0.1017	0.1067	0.5119
<i>Public expenditure in R&amp;D</i>	1,236	0.0053	0.0023	0.0000	0.0146
<i>Private expenditure in R&amp;D</i>	1,236	0.0048	0.0034	0.0000	0.0141
<i>Firm registry</i>	1,236	0.0147	0.0132	-0.0709	0.0641
<i>High potential export</i>	1,236	0.2919	0.2040	0.0007	0.9343
<i>Patents</i>	1,030	0.6064	0.6080	0.0000	3.2163
<i>Weight - Agriculture</i>	1,236	0.0363	0.0245	0.0015	0.1776
<i>Weight - Industry</i>	1,236	0.2744	0.0830	0.1098	0.4863
<i>Weight - Services</i>	1,236	0.6892	0.0771	0.4953	0.8755
<i>Handicraft firms</i>	1,236	0.1424	0.0367	0.0444	0.2658
<i>Ceased firms</i>	1,236	2,879.1	3,492.9	289	38.685
<i>Firm riskiness</i>	1,236	0.0200	0.0195	0.0016	0.2511
<i>Railway transports</i>	1,236	0.2931	0.0743	0.1167	0.4453
<i>Transports on the road</i>	1,236	0.2367	0.1177	0.0532	0.6491
<i>Public transports</i>	1,236	0.1885	0.0458	0.0926	0.3099
<i>Hospital attractiveness</i>	1,133	0.0841	0.0542	0.0122	0.2742
<i>Human capital</i>	1,236	0.9114	0.0634	0.6171	1.0523
<i>Bloodlettings</i>	1,236	0.0004	0.0007	0.0000	0.0213
<i>Volunteering</i>	1,236	0.1128	0.0423	0.0476	0.2828
<i>Separate rubbish</i>	1,133	0.2250	0.1679	0.0002	1.4288
<i>Cooperatives</i>	1,236	0.0403	0.0096	0.0268	0.0719
<i>Banking loans</i>	1,236	0.7567	0.2701	0.2708	2.2182
<i>BCC market shares</i>	1,236	0.0740	0.0768	0.0001	0.5432

**Table 3. Equation (1) – without social capital**

<i>Regressors</i>	<i>Dependent variable: local economic growth</i>							
<i>constant</i>	0.0603	***	0.0668	**	0.2079	**	0.0570	**
$y_{i,t-1}$	0.1713	***	0.1612	***	0.1752	***	0.1671	***
<i>Initial income<sub>t</sub></i>	-0.0625	**	-0.0602	**	-0.1412	**	-0.0556	**
<i>Employment<sub>t</sub></i>	0.0805	**	-		-		-	
<i>Inflation<sub>t</sub></i>	-		0.1664		-		-	
<i>Public expenditure<sub>t</sub></i>	-		-		-0.1052	**	-	
<i>Trade openness<sub>t</sub></i>	-		-		-		-0.0053	
<i>Banking loans<sub>t-1</sub></i>	0.0225	**	0.0220	*	0.0199	**	0.0220	**
<i>Human capital<sub>t</sub></i>	0.0429	**	0.0320	*	0.0376	*	0.0392	**
<i>Fixed effects</i>	yes		yes		yes		yes	
<i>Observations</i>	836		760		836		836	
$R^2$	0.2420		0.2232		0.2836		0.2022	

Results are from equation (1) without the social capital ( $S_{i,t}$ ). Dependent variable is the annual growth rate of total value added per capita at county level. *Initial income* is the logarithmic transformation of the initial income per capita income at county level. *Employment* is the annual change of the number of employees at county level. *Inflation* is the logarithmic transformation of the annual change in the consumer price index at county level. *Public expenditure* is the total government expenditure divided by the total value added at regional level. *Trade openness* is the sum of export and import divided by the total value added at regional level. *Banking loans* is the ratio between banking loans and total value added at county level. *Human capital* is the percentage over the total number of people aged 14-18 enrolled at secondary schools at regional level. The complete list of variables' definition and sources is available in Table 1. Preliminary statistics are in Table 2.

Regression techniques is linear *within* estimator with fixed effects for counties. \*, \*\* and \*\*\* indicate statistical significance respectively at 10%, at 5% and at 1%.

*Source:* Authors calculations on data by Istat, Bank of Italy, Tagliacarne Institute, Avis.

**Table 4. Equation (1) – with social capital**

<i>Regressors</i>	<i>Dependent variable: local economic growth</i>							
<i>constant</i>	0.0700	***	0.0896	***	0.0718	**	0.0706	***
$y_{i,t-1}$	0.1724	***	0.1534	***	0.1654	***	0.1719	***
<i>Initial income<sub>t</sub></i>	-0.0720	**	-0.1194	**	-0.0859	**	-0.0679	***
<i>Employment<sub>t</sub></i>	0.0798	**	0.0875	**	0.0859	**	0.0798	*
<i>Banking loans<sub>t-1</sub></i>	0.0198	*	0.0080		0.0212	**	0.0221	*
<i>Human capital<sub>t</sub></i>	0.0452	**	0.0815	***	0.0620	***	0.0452	**
<i>Bloodlettings<sub>t</sub></i>	0.0086		-		-		-	
<i>Volunteering<sub>t</sub></i>	-		0.2553	**	-		-	
<i>Separate rubbish<sub>t</sub></i>	-		-		0.0252	**	-	
<i>Cooperatives<sub>t</sub></i>	-		-		-		-0.1078	
<i>Fixed effects</i>	yes		yes		yes		yes	
<i>Observations</i>	836		836		836		836	
$R^2$	0.2484		0.2864		0.2231		0.2472	

Results are from restricted equation (1) with the social capital ( $S_{i,t}$ ). Dependent variable is the annual growth rate of total value added per capita at county level. *Initial income* is the logarithmic transformation of the initial income per capita income at county level. *Employment* is the annual change of the number of employees at county level. *Banking loans* is the ratio between banking loans and total value added at county level. *Human capital* is the percentage over the total number of people aged 14-18 enrolled at secondary schools at regional level at regional level. *Bloodlettings* is the number of bloodlettings per capita at regional level. *Volunteering* is the percentage of people aged more than 14 years who did voluntary work activities during last year at regional level. *Separate rubbish* is the percentage of the total amount of rubbish collected separately (kilograms) over the total amount of rubbish collected during last year at county level. *Cooperatives* is the percentage over the total number of employees of those employed by a cooperative firm at regional level. The complete list of variables' definition and sources is available in Table 1. Preliminary statistics are in Table 2. Regression techniques is linear *within* estimator with fixed effects for counties. \*, \*\* and \*\*\* indicate statistically significance respectively at 10%, at 5% and at 1%.

*Source:* Authors calculations on data by Istat, Bank of Italy, Tagliacarne Institute, Avis.

**Table 5. Equation (2) – Quality of local infrastructures**

<b>Regressors</b>	<b>Dependent variable: local economic growth</b>							
<i>constant</i>	0.0867	***	0.1003	**	0.0566	**	0.0737	**
$y_{i,t-1}$	0.1669	***	0.1675	***	0.1647	***	0.1633	***
<i>Initial income<sub>t</sub></i>	-0.1064	**	-0.1047	**	-0.0865	**	-0.0874	**
<i>Employment<sub>t</sub></i>	0.0854	*	0.0794	*	0.0875	**	0.0852	**
<i>Banking loans<sub>t-1</sub></i>	0.0222	**	0.0164	*	0.0240	**	0.0196	*
<i>Human capital<sub>t</sub></i>	0.0626	***	0.0564	***	0.0685	***	0.0668	***
<i>Separate rubbish<sub>t</sub></i>	0.0230	*	0.0162		-		0.0235	*
<i>Railway transports<sub>t</sub></i>	0.0476	**	-		-		-	
<i>Transp. on the road<sub>t</sub></i>	-		0.0397		-		-	
<i>Public transports<sub>t</sub></i>	-		-		0.0405		-	
<i>Hospital attract<sub>t</sub></i>	-		-		-		-0.0273	**
<i>Fixed effects</i>	yes		yes		yes		yes	
<i>Observations</i>	836		836		836		836	
$R^2$	0.2479		0.2560		0.2136		0.2266	

Results are from restricted equation (2). Dependent variable is the annual growth rate of total value added per capita at county level. *Initial income* is the logarithmic transformation of the initial income per capita income at county level. *Employment* is the annual change of the number of employees at county level. *Banking loans* is the ratio between banking loans and total value added at county level. *Human capital* is the percentage over the total number of people aged 14-18 enrolled at secondary schools at regional level. *Separate rubbish* is the percentage of the total amount of rubbish collected separately (kilograms) over the total amount of rubbish collected during last year at county level. *Railway transports* is given by the inbound and outbound goods moved by train in terms of tons per capita at regional level. *Transports on the road* is given by the inbound and outbound goods moved on the road in terms of tons per capita at regional level. *Public transports* is the percentage over the total number of people who moved for working/studying reasons using public transports at regional level. *Hospital attractiveness* is the percentage over the total number of people hospitalized coming to local hospitals from another region. The complete list of variables' definition and sources is available in Table 1. Preliminary statistics are in Table 2.

Regression techniques is linear *within* estimator with fixed effects for counties. \*, \*\* and \*\*\* indicate statistical significance respectively at 10%, at 5% and at 1%.

Source: Authors calculations on data by Istat, Bank of Italy, Tagliacarne Institute, Avis.

**Table 6.a Equation (3) – Local productive environment (I)**

<i>Regressors</i>	<i>Dependent variable: local economic growth</i>							
<i>constant</i>	0.0691	**	0.0749	**	0.0696	**	0.0765	***
<i>y<sub>i,t-1</sub></i>	0.1656	***	0.1650	***	0.1545	***	0.1617	***
<i>Initial income<sub>t</sub></i>	-0.0846	**	-0.0877	**	-0.0785	**	-0.0894	**
<i>Employment<sub>t</sub></i>	0.0860	**	0.0899	**	0.0842	**	0.0826	**
<i>Banking loans<sub>t-1</sub></i>	0.0211	**	0.0221	**	0.0209	*	0.0207	**
<i>Human capital<sub>t</sub></i>	0.0619	***	0.0574	***	0.0545	**	0.0649	***
<i>Separate rubbish<sub>t</sub></i>	0.0255	*	0.0268	*	0.0269	*	0.0246	*
<i>Firm registry<sub>t</sub></i>	0.0579		-		-		-	
<i>High potential exp<sub>t</sub></i>	-		0.0096		-		-	
<i>Patents<sub>t</sub></i>	-		-		-0.0025		-	
<i>Firm riskiness<sub>t</sub></i>	-		-		-		-0.0846	*
<i>Fixed effects</i>	yes		yes		yes		yes	
<i>Observations</i>	836		836		836		836	
<i>R<sup>2</sup></i>	0.2336		0.2238		-0.2035		0.2324	

Results are from restricted equation (3). Dependent variable is the annual growth rate of total value added per capita at county level. *Initial income* is the logarithmic transformation of the initial income per capita income at county level. *Employment* is the annual change of the number of employees at county level. *Banking loans* is the ratio between banking loans and total value added at county level. *Human capital* is the percentage over the total number of people aged 14-18 enrolled at secondary schools at regional level. *Separate rubbish* is the percentage of the total amount of rubbish collected separately (kilograms) over the total amount of rubbish collected during last year at county level. *Firm registry* is the rate of net enrollment at the local registry of new firms at regional level. *High potential exp* is export in those sectors where foreign demand is stronger at county level. *Patents* is the number of new patents registered at the European Patent Office (EPO) during last year at regional level. *Firm riskiness* is the new non-performing loans to loans ratio at regional level. The complete list of variables' definition and sources is available in Table 1. Preliminary statistics are in Table 2.

Regression techniques is linear *within* estimator with fixed effects for counties. \*, \*\* and \*\*\* indicate statistically significance respectively at 10%, at 5% and at 1%.

Source: Authors calculations on data by Istat, Bank of Italy, Tagliacarne Institute, Avis.

**Table 6.b** Equation (3) – Local productive environment (II)

<i>Regressors</i>	<i>Dependent variable: local economic growth</i>							
<i>constant</i>	0.0733	***	0.0712	**	0.0824	***	0.0725	**
$y_{i,t-1}$	0.1656	***	0.1675	***	0.1673	***	0.1569	***
<i>Initial income<sub>t</sub></i>	-0.0860	**	-0.0879	***	-0.0879	***	-0.0860	**
<i>Employment<sub>t</sub></i>	0.0859	**	0.0855	**	0.0855	**	0.0842	**
<i>Banking loans<sub>t-1</sub></i>	0.0211	**	0.0197	*	0.0198	*	0.0180	
<i>Human capital<sub>t</sub></i>	0.0613	***	0.0636	***	0.0645	***	0.0562	***
<i>Separate rubbish<sub>t</sub></i>	0.0247	*	0.0241	*	0.0246	*	0.0234	*
<i>Weight agriculture<sub>t-1</sub></i>	-0.0113		-		-		-	
<i>Weight manufact<sub>t-1</sub></i>	-		0.0120		-		-	
<i>Weight services<sub>t-1</sub></i>	-		-		-0.0130		-	
<i>Handcraft firms<sub>t-1</sub></i>	-		-		-		0.0532	
<i>Fixed effects</i>	yes		yes		yes		yes	
<i>Observations</i>	836		836		836		836	
$R^2$	0.2236		0.2343		0.2347		0.2276	

Results are from restricted equation (3). Dependent variable is the annual growth rate of total value added per capita at county level. *Initial income* is the logarithmic transformation of the initial income per capita income at county level. *Employment* is the annual change of the number of employees at county level. *Banking loans* is the ratio between banking loans and total value added at county level. *Human capital* is the percentage over the total number of people aged 14-18 enrolled at secondary schools at regional level. *Separate rubbish* is the percentage of the total amount of rubbish collected separately (kilograms) over the total amount of rubbish collected during last year at county level. *Weight agriculture* is the weight of the value added of agriculture sector over total value added at regional level. *Weight manufacturing* is the weight of the value added of manufacturing sector over total value added at regional level. *Weight services* is the weight of the value added of services sector over total value added at regional level. *Handcraft firms* is the weight of the value added from handcraft firms over total value added at county level. The complete list of variables' definition and sources is available in Table 1. Preliminary statistics are in Table 2.

Regression techniques is linear *within* estimator with fixed effects for counties. \*, \*\* and \*\*\* indicate statistically significance respectively at 10%, at 5% and at 1%.

Source: Authors calculations on data by Istat, Bank of Italy, Tagliacarne Institute, Avis.

**Table 7. Equation (4) – Cooperative Credit Banks (BCCs)**

<i>Regressors</i>	<i>Dependent variable: local economic growth</i>									
<i>constant</i>	0.0605	**	0.0570	**	0.0680	***	0.0856	**	0.0883	**
$y_{i,t-1}$	0.1634	***	0.1611	***	0.1620	***	0.1658	***	0.1614	***
<i>Initial income<sub>t</sub></i>	-0.0884	**	-0.0889	**	-0.0929	**	-0.0896	**	-0.0948	**
<i>Employment<sub>t</sub></i>	0.0912	**	0.0884	**	0.0857	**	0.0846	**	0.0851	**
<i>Banking loans<sub>t-1</sub></i>	0.0201	*	0.0205	*	0.0216	**	0.0216	*	0.0187	*
<i>Human capital<sub>t</sub></i>	0.0807	***	0.0827	***	0.0759	**	0.0513	***	0.0619	***
<i>Separate rubbish<sub>t</sub></i>	0.0270	**	0.0300	**	0.0259	**	0.0276	**	0.0248	*
<i>LB</i>	-0.0647		-		-		-		-	
$LB^2_t$	0.2986	*	-		-		-		-	
<i>LB*North-East<sub>t</sub></i>	-		-0.0707	*	-		-		-	
$LB*North-East^2_t$	-		0.3294	**	-		-		-	
<i>LB*North-West<sub>t</sub></i>	-		-		0.1370		-		-	
$LB*North-West^2_t$	-		-		-0.5806		-		-	
<i>LB*Centre<sub>t</sub></i>	-		-		-		0.1198		-	
$LB*Centre^2_t$	-		-		-		-0.7220		-	
<i>LB*South<sub>t</sub></i>	-		-		-		-		-0.2314	
$LB*South^2_t$	-		-		-		-		1.3063	
<i>Fixed effects</i>	yes		Yes		Yes		Yes		Yes	
<i>Observations</i>	836		836		836		836		836	
$R^2$	0.2193		0.2084		0.2208		0.2299		0.2375	

Results are from restricted equation (4) with the social capital ( $S_{i,t}$ ). Dependent variable is the annual growth rate of total value added per capita at county level. *Initial income* is the logarithmic transformation of the initial income per capita income at county level. *Employment* is the annual change of the number of employees at county level. *Banking loans* is the ratio between banking loans and total value added. *Human capital* is the percentage over the total number of people aged 14-18 enrolled at secondary schools. *Separate rubbish* is the percentage of the total amount of rubbish collected separately (kilograms) over the total amount of rubbish collected during last year. *LB* is the loan market share of Cooperative Credit Banks at county level. *LB\*North* is the loan market share of Cooperative Credit Banks at county level only for those counties in the Northern Italy. *LB\*Centre* is the loan market share of Cooperative Credit Banks at county level only for those counties in the Centre of Italy. *LB\*South* is the loan market share of Cooperative Credit Banks at county level only for those counties in the Southern Italy. The complete list of variables' definition and sources is available in Table 1. Preliminary statistics are in Table 2.

Regression techniques is linear *within* estimator with fixed effects for counties. \*, \*\* and \*\*\* indicate statistical significance respectively at 10%, at 5% and at 1%.

*Source:* Authors calculations on data by Istat, Bank of Italy, Tagliacarne Institute, Avis.