Agglomeration, Networking and the Great Recession

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Abstract: The aim of this paper is to analyse how and to what extent firms' external relations, such as the belonging to a local cluster or to a business group, affect the probability of firm survival and economic performance after the Great Recession of 2008. Our main hypothesis is that belonging to a business group or to a local cluster will mitigate the selection effects determined by real and financial shocks and that only the more efficient units in 'isolated' firms will survive. This means that firms that are part of a group or are located within a local cluster can be expected to show a lower likelihood of failure, but also lower performance compared to standalone firms. Estimating instrumental variable econometric models and using a large dataset of 155,841 Italian manufacturing joint stock companies, 28,167 of which are part of a group, we test these hypotheses for the period 2005-2012. Our results confirm expectations. Firms located in local clusters or that belong to a business group show higher rates of survival rate during the Great Recession compared to standalone firms. However, the latter show higher levels of performance in terms of growth and profitability.

Keywords: Business groups, local clusters, recession

JEL classification: R3

1. Introduction

Firm performance depends not only on the firm's internal organization and strategic choices but also on the network of the firm's relations with other firms. These relations may influence the ability of the firm to obtain knowledge and information for innovation, to acquire specific production inputs and to access financial resources. The two most important network types are business groups and local clusters.[1] In the case of business groups the relations among firms are based on ownership ties. A business group is defined as a set of legally independent firms controlled by the same person(s). The vertex of the group can be an individual or a group of people, often members of the same family (Almeida and Wolfenzon, 2006). Belonging to a group may facilitate access to finance, thanks to the functioning of an internal capital market (Hamelin, 2011). This type of network may also facilitate exchanges of production inputs and managerial resources among group units. As a result, firms that are part of a group may have superior investment and innovation abilities (Belenzon and Berkovitz, 2010).

In the case of local clusters, a large regional economics and economic geography literature investigates the advantages of the spatial agglomeration of firms in the same industry or production chain (Glaeser *et al.* 1992; Porter, 1998). The key idea in this stream of work, which dates back to Marshall's (1920) contribution on industrial districts, is that firms that are located close to other firms and are operating in the same industry benefit from reduced transportation costs, emergence of external-scale economies, availability of specialised workers and suppliers, and diffusion of intra-industry knowledge and technological spillovers (Glaeser *et al.*, 1992; Duranton & Puga, 2004; Martin *et al.*, 2011). In addition, several studies on Italian industrial districts suggest the existence of another advantage for firms located within local productive systems: the complex web of vertical and horizontal (informal) relationships occurring between these firms, which may have a positive influence on their economic performance.

[1] The literature on these issues is too large to be reviewed here. In this paper, we refer to works directly connected to our research hypotheses.

These two types of networking – business groups and local clusters – can co-exist and be self-reinforcing. Some studies suggest that the spatial agglomeration of firms may favour the formation of business groups (Brioschi *et al.*, 2002). This typology of business groups located within industrial districts are described as "district groups" to convey the idea of a group able to benefit from agglomeration forces.

Agglomeration and networking are expected to play a relevant role in firm performance in the presence of real or financial shocks. However, the direction of this effect is not straightforward. The sudden decrease in international and domestic demand, which started in autumn 2008, as a result of the financial crisis, , and the subsequent credit-crunch, offer an ideal setting to evaluate the different effects of belonging to a business group and being part of a local cluster. Business groups may benefit from the diverse activities performed by group companies and the possibility of sharing the group's financial resources (internal capital market). Firms that are part of a local cluster are characterized by a web of co-operative relations with other companies, which provide shared advantages to sustain long-term relations along the production chain (Ottati, 1994). For these reasons, we expect that firms belonging to a group or a local cluster will be more likely to survive during periods of real financial and other shocks. However, in the context of consider firm growth and profitability, firms belonging to groups may survive despite poor performance, while standalone firms, subjected to the same conditions, may be forced to exit the market. Thus, we expect analysis of firms that survived the Great Recession, to show that standalone firms will perform better than firms that are part of a group or a local cluster.

Our empirical analysis refers to Italy. This country is an interesting setting for our analysis for two reasons. First, the harshness of the demand shock that hit the industrial system at the beginning of the crisis (2009) and the severity of the credit-crunch during subsequent years, favoured the stagnation of domestic demand in 2011 and 2012. Second, business groups and local clusters (industrial districts) are relevant for the organization of manufacturing production in Italy.

To test these hypotheses empirically, the paper uses a novel dataset of Italian business groups, developed using ownership information on joint stock companies, taken from the AIDA database. This allows us to map Italian manufacturing business groups in 2012. The AIDA database also provides financial and economic information for group and non-group companies , during the period 2005-2012. The data refer to around 155,839 Italian joint stock companies, 28,168 of which are part of a group. We use Instrumental Variables (IV) econometric models to identify determinants of the probability of firm survival, and economic performance (Return on Assets (ROA) and sales growth). To understand how clustering and/or networking determined the response of firms following the 2008 Great Recession, we compare standalone companies with group firms and analyse the characteristics of groups within and outside industrial districts.

Overall, our results support the hypotheses that belonging to a group or a cluster raises the likelihood of surviving harsh conditions even if firms show growth and profitability performance.

The paper is organized as follows. Section 2 reviews the literature on the effect of business groups and local clusters on firm performance. Section 3 describes the dataset and the econometric methodology. Section 4 presents the main results. Section 5 concludes the paper.

2. Literature background and research hypotheses

2.1. The role of business groups

The literature on business groups shows that the business group phenomenon is widespread, across all size classes and all countries (e.g Bae *et al.*, 2008; 2002; Fan *et al.*, 2005; Ferris *et al.*, 2003; Gopalan *et al.*, 2007; Khanna and Yafeh, 2007). The presence of business groups in many different countries is emphasized by several authors (e.g., Gorodnichenko *et al.*, 2009; Hamelin, 2011; Khanna and Yafeh, 2005), and especially in emerging economies (Samphantharak, 2003). The business group is a corporate organizational form common to both developed and developing markets (Bianco and Nicodano, 2006).

There are several theoretical justifications for the presence of business groups. There is a large body of literature that refers to emerging countries and explains the presence of (especially large) business groups as a response to the weakness of market institutions, particularly financial markets. For example, one of the most important features of the business group is the possibility to transfer financial resources among affiliated companies (internal capital market).

Capital markets are imperfect. For this reason external finance is more costly than internal funding. These market imperfections are more evident in emerging economies, where financial markets are underdeveloped and firms are more subject to financial constraints. Belonging to a group can help to overcome these constraints, which favours firm investments. Several empirical works show that companies belonging to groups are less dependent on internal cash-flows to finance their investments. This is particularly relevant for investments in innovation activities where information asymmetries between managers and investors are higher. The presence of an internal capital market is one of the main reasons for the superior innovativeness of firms that belong to a group compared to standalone firms (Belenzon and Berkovitz, 2010).

The easier access to financial resources is expected to facilitate investment and growth by affiliated companies, but may not result in superior financial performance. Several studies show lower performance of affiliated firms compared to independent firms (Bae *et al.*, 2002; Claessens *et al.*, 2002; George and Kabir, 2008; Joh, 2003; Lins, 2003) and this is more evident in the case of large groups. The lower performance of affiliated firms compared to independent firms, is caused by redistribution of the profits from high to low performing firms. Some authors (e.g., Almeida and Wolfenzon, 2006b) argue that one of the reasons for the lower performance of affiliated firms might be that standalone firms, which have fewer available resources, invest them in more profitable projects, while affiliated firms that benefit from greater amounts of internal resources, invest also in less profitable projects.

However, Hamelin (2011) considers a panel of French SMEs and finds that affiliated firms achieve higher performance than non-affiliated firms. Khanna and Yafeh (2007) argue that in

diversified groups, the performance of affiliated firms may be country-specific: in emerging markets, it is easier to find diversified groups where the performance of affiliated firms is sacrificed in favour of maintaining the stability of the overall group.

In general, we expect that belonging to a business group will favour innovation and continuity, rather than profitability. This applies especially in a context of a real or financial crisis, when group firms - even when performing poorly - likely survive, thanks to the support provided by their controlling companies, while poorly performing standalone firms in the same context may be forced to quit the market.

In the short-term, the financial support provided by the group may result in the survival of inefficient firms, thus, producing a negative welfare effect (Almeida and Wolfenzon, 2006a). However, the overall effect is not clear since, in the longer run, it may avoid the dispersion of productive resources that follow the dissolution of firms. This role of business group is especially relevant in periods of economic crisis. Affiliated firms may be able to withstand the effect of a real or financial shock for a longer period, thanks to the support provided by the other companies in the group.

We test this hypothesis by comparing the performance of standalone firms and firms belonging to groups, during the period 2008-2012, for Italy. The Italian case is relevant because, after the economic and financial shock of 2008-2009, the country entered a three-year period (2010-2012) characterized by domestic recession and a severe credit-crunch. According to Landini (2016), between 2008 and 2012, thousands of firms exited the market and, especially, those firms with no competitive rents. This selection effect, which is always in place because of market competition (Jovanovic, 1982), was exacerbated in the presence of the sharp contraction of demand in 2009 and the subsequent period of domestic stagnation and credit crunch.

When considering the performance of firms during the Great Recession, the effect of belonging to a business group may not be straightforward because of contradictory effects at work. On the one hand, the support of the group may help companies to achieve superior performance

compared to standalone firms: this might be due to the sharing of resources, easier access to finance or support in the form of inter-company exchanges of goods and services. At the same time, this softening of the selection effect may result ultimately in the survival, within groups, of firms with poor performance in terms of both growth and profitability. Which of these two effects prevails is an empirical question.

2.2. The role of local clusters

It is well known that firms in local clusters may benefit not only from agglomeration externalities but also from complex webs of vertical and horizontal relations. Among agglomeration advantages, firms benefit from the three "traditional" sources of local externalities proposed originally by Marshall (1920): (i) input sharing; (ii) labour market pooling; and (iii) knowledge spillovers. In addition, several studies on Italian industrial districts suggest the existence of another advantage for firms located within local clusters: the peculiar blend of competitive and cooperative behaviours. An example of these relationships can be seen in the management of commercial relations (Gabi Dei and Dei Ottati, 1994). These two mechanisms – agglomeration externalities and competitive-cooperative relationships – may have a generally positive effect on the probability of firm survival. For this reason, we expect that during the Great Recession, agglomerative externalities and collaborative behaviours among industrial district firms, enhanced the likelihood that these firms would survive, compared to similar, non-district firms.

However, as in the case of belonging to a group, the softening of the selection effect in local clusters may result in the survival of poor performing firms that would otherwise have exited the market. Compared to belonging to a group, both effects (the softening of the selection effect and the supporting effect) are expected to be smaller. However, it is not possible to hypothesize *ex-ante* which of the two effects prevails. However, based on studies carried out before the Great Recession of 2008, we know that firms belonging to local clusters achieve higher profitability and higher productivity as

well as higher rates of product innovation, than non-cluster firms (Fabiani *et al.*, 2000)(Cainelli and De Liso, 2004).

In the scheme we summarize our expectations about firm survival and economic performance.

	Likelihood of survival	**Growth**	**Profitability**
Belonging to a group	++	+ (supporting effect) - (selection effect)	+ (supporting effect) - (selection effect)
Belonging to a local cluster	+	+ (supporting effect) - (selection effect)	+ (supporting effect) - (selection effect)

We expect that belonging to a business group or being part of a local cluster has a positive effect on the likelihood of survival during the Great Recession. In the case of growth and profitability we do not have an *a-priori* expectation since the supporting role provided by belonging to a group or a local cluster may be offset during the crisis, by the stronger selection effect on standalone companies and the softening of this effect on companies belonging to a group or a local cluster. As a result, we may observe that belonging to a group or a local cluster might have a negative impact on average firm performance.

3. Data and econometric methodology

3.1. The dataset

This paper uses a novel dataset of Italian business groups, developed using ownership information about joint stock companies drawn from the AIDA database. This database provides financial and economic information for manufacturing firms, belonging or not to business groups, for the period 2005-2012. Data refer to 155,841 Italian manufacturing joint stock companies, 28,167 of which are group firms. This allows us to identify the entire map of Italian business groups with at least one of their firms in the manufacturing sector. Specifically, our dataset includes 55,909 companies belonging

to groups: 28,167 manufacturing firms, 17,267 from other sectors, and 10,475 foreign firms. The total number of observations is around 600,000.

To identify local clusters we use the Local Labour Systems (LLSs) identified by ISTAT (the Italian national statistics agency), using information taken from the 2011 Italian population census. Specifically, ISTAT identifies 611 LLSs, defined as sub-regional geographical areas where most of the local population commutes for work reasons, and 141 industrial districts.

Tables 1, 2 and 3 present the main characteristics of our dataset, 2 and 3. Table 1 - summarizes the list of variables used in the empirical analysis, their definition and calculation. Table 2 and 3 present some descriptive statistics for the variables included in the empirical analysis: note that firms belonging to groups are usually older than standalone firms. Also, group firms show higher values for length of debt and firm productivity (output). Table 4 reports the correlation matrix.

Figure 1 shows the share of employees in business groups in total employees for all LLSs, and for those identified as industrial districts.

3.2 The econometric methodology

We investigate the effects of belonging to a business group and belonging to an industrial district, first, on firm survival and then on their economic performance.

3.2.1. The effect on firm survival

The first effect is analysed using two different models: a probit model and a IV Linear Probability Model (IV-LPM). First, we estimate the following probit model:

$$\Pr(Y_1 = 1|\text{district}, \text{group}, \mathbf{X}) = \phi(\theta_0 + \theta_1 \text{district} + \theta_2 \text{group} + \mathbf{X}\boldsymbol{\vartheta})$$

where $\phi(\cdot)$ is the cumulative distribution function of the standard normal random variable and $\mathbf{X}$ is the vector of the control variables including: (i) 19 geographical dummies at two-digit codes; (ii) 6

time dummies; (iii) 3 Pavitt sector dummies (Specialized suppliers - *SS*; Science-Based - *SB;* Scale-Intensive - *SI;* and Dominated-Suppliers - *DS* with is the reference dummy); (iv) *output* which measures the firm's level of output; (v) *age* measuring number of years since foundation; (vi) *len_debt* measuring the length of the firm's indebtedness to suppliers; (vii) *bank_loan* given as the ratio between loans and total assets; (viii) *cost_out* as the ratio between acquired goods and services in total production costs, which measures the degree of external outsourcing (the reverse of vertical integration).

The dependent variable, Y_1, is a dummy that takes the value 1 if the firm survived for at least three consecutive years during the period 2005-2012 and 0 otherwise. This probit model estimates the determinants of the probability of firm survival assuming that the explanatory variables – in particular, the dummy variables *district* and *group* – are exogenous. If these two variables are endogenous, they will be correlated with the error term. This requires an IV approach. To deal with potential endogeneity of these two explanatory variables we estimate a IV-LPM:

$$\Pr(Y_1 = 1|\mathbf{X}, \mathbf{Z}) = \theta_0 + \theta_1 \text{district} + \theta_2 \text{group} + \mathbf{X}\boldsymbol{\vartheta} + \varepsilon$$

where $\mathbf{Z}$ is the vector of the instruments and ε is the error term with the usual statistical properties. Using this second approach, we need to identify valid instruments for the business group and industrial district variables. For business group, we use the majority shares (%) for the firms belonging to business groups. Majority share refers to the ultimate owner with a minimum percentage of 50.01%. The idea behind this choice is that, in controlled firms – that is, firms belonging to business groups – this share is significantly higher with respect to standalone companies. In this sense, it can be considered a sort of "group marker". In addition, the variable generally is not correlated with the probability of the firm surviving.

For the industrial district dummy, we use history as the source of exogenous spatial variation in the geographical distribution of industrial districts. Specifically, we select two types of historical data to predict the industrial district variable. The first is a measure of district intensity at the

provincial level. This variable is given by the ratio between the number of workers employed in district manufacturing firms and total manufacturing employment at the provincial level in 1991 (Arcangelis and Ferri, 2002). The second set of historical data consists of information on past dominances. The underlying idea is that different historical political and institutional traditions may have stimulated the accumulation of social capital, favouring the development of local clusters. We use as instruments information on past majorities governing each Italian province during the 700 years before the unified Italian State was created (Di Liberto and Sideri, 2015). Specifically, these data measure the number of years during which Italian provinces were governed by one of the following: Normans, Swabia, Savoy, Papal, Anjou, Spain, Austria, Bourbon and Venice. We check the goodness of our instrumentation strategy using different statistical tests. Table 6 presents p-values for the Hansen J statistic, the Wu-Hausman and the Durbin-Wu-Hausman tests which all confirm the goodness of fit of our instruments.

3.2.2. The effect on firm economic performance

To analyse the effects of belonging to a business groups and to an industrial district on the economic performance of surviving firms, we estimate the following (linear) equation:

$$Y_2 = \beta_0 + \beta_1 \text{district} + \beta_2 \text{group} + \mathbf{X}\boldsymbol{\gamma} + \text{v}$$

where Y_2 is the firm's economic performance measured as ROA (a measure of profit performance) and as yearly sales variation (a measure of growth performance). As before, *district* is a dummy variable that takes the value 1 if the firm is located within a local cluster and 0 otherwise, while *group* is a dummy that takes the value 1 if the firm belongs to a business group and 0 otherwise. Finally, $\mathbf{X}$ is a vector of the controls and v is the error term. Under the assumption that $E[\text{v}|\text{district}, \text{group}, \mathbf{X}] = 0$, the equation can be estimated consistently using an Ordinary Least Squares (OLS) estimator. If the

two dummy variables – *district* and *group* – are endogenous, OLS will provide inconsistent estimates. There two sources of (potential endogeneity): (i) sample selection (an omitted variables problem) and (ii) simultaneity.

We deal with these endogeneity problems by employing an instrumental variable (IV) approach. Specifically, we adopt a three-stage procedure (Adams *et al.,* p. 142, 2009). In the first stage, we estimate two probit models for the determinants of belonging to an industrial district and to a business group. In the second-stage, we regress *district* and *group* on **X** and on the fitted values of *district* and *group* obtained during the first stage. In the third-stage, we regress Y_2 on **X** and on the fitted values of *district* and *group* obtained in the second stage.

There are some advantages from adopting this econometric approach (Adams *et al.*, 2009). First, it takes account of the binary nature of the endogenous variables: in our case, the group and district dummy variables. Second, it does not require the binary response model in the first stage to be specified correctly. Third, although some regressors are generated in the first stage, the usual IV standard errors remain asymptotically valid (Wooldridge, 2002).

In order to implement this three-stage econometric procedure, we need to identify valid instruments for the business group and industrial district variables. We adopt the instruments used to analyse the determinants of the probability of firm survival.

4. **Empirical results**

Table 6 presents the results of the estimates of the determinants of firm survival during the period considered. After controlling for several variables that might affect the probability of survival, we find that belonging to a business group and to a local cluster has a positive effect on the likelihood of survival. This finding is consistent with our expectations. Also, as expected, we find that belonging to a group has a much stronger effect on the likelihood of surviving than belonging to a local cluster. The other variables considered in the analysis show the expected signs. Age is positive and statistically significant, while the coefficient of output is positive and significant only in the probit

estimates; In the IV-LPM estimates this coefficient loses its significance. This means that older companies have a higher probability of surviving, while the role played by firm size is ambiguous. The outsourcing variable is positive and statistically significant, indicating the better ability of disintegrated firms to respond to external shocks such as an economic crisis. This result is not surprising since vertical disintegration allows firms higher degrees of organizational and productive flexibility.

Finally, financial variables, such as the length of time of the firm's indebtedness to suppliers and the ratio between bank loans and total assets, have a negative impact on the probability of surviving. Again, this finding is as expected. Financial weakness is one of the main factors increasing the probability that a firm will exit the market.

In the case of the determinants of firm performance , the results are less straightforward, due, as discussed previously, to two contrasting and overlapping effects (Table 7). On the one hand, belonging to a group or a local cluster provides the firm with several advantages and supports firm performance. At the same time, the positive effect on survival that we observed in the previous estimate softens the selection effect, which was particularly strong during the real and financial crises that characterized the period under observation. As a result, in the case of standalone firms, only the fittest (i.e. the best performers) survive, while the belonging to a group or to a local cluster allows poorly performing firms also to survive. Specifically, in the case of firms belonging to a group, the estimates show a positive effect on profitability, but a negative effect on sales growth. In other words, in the case of profitability, the support provided by belonging to a group prevails over the selection effect. However, in the case of sales growth, belonging to a group allows the survival of poorly performing firms.

In contrast, belonging to a local cluster has a negative impact on both, profitability and sales growth. Previous work on the role of local clusters shows that, in stable periods, the 'supporting' effect of agglomeration has a positive impact on firm performance. However, during periods of tight finance and financial crisis, the softening of the selection effect produces a negative effect on

performance by allowing the survival of firms with weak performance. As expected, the magnitude of the effect on performance determined by the belonging to a local cluster is much smaller than the effect of belonging to a group.

When we consider the other explanatory variables, we find that their effect is similar to the previously observed effects on the probability of survival. The financial weakness of firms, measured by the level of financial debts in total assets, has a negative impact on both profitability and growth. The estimates confirm the positive impact of cost outsourcing on firm performance. Firms that concentrated their investment in core activities and outsourced other phases of the value chain were more able not only to survive but also to perform better during the crisis.

It is interesting that, in these estimates, firm age has a negative impact on both profitability and sales growth performance, but a positive effect on the probability of survival. Similar to the mechanism discussed in relation to the role of groups and clustering, in this case, also, the greater resilience to the crises of older firms produces a trade-off between survival and performance.

5. Conclusions

External relations are of importance not only for firm survival but also for firm economic performance. Focusing on two types of external relations –location of a firm within a local cluster and belonging to a business group – this paper investigated how and to what extent these network types affected the probability of firm survival and economic performance after the Great Recession of 2008.

The strength of external relations was expected to have a positive impact on survival during the crisis, but an ambiguous effect on performance. This is because the softening of the selection effect provided by belonging to a group or a local cluster allows poor performing firms also to survive, while in the case of standalone firms only the best performing companies will remain in the market.

Our findings are in line with our expectations. The empirical results for manufacturing firms in Italy show that firms located in local clusters (industrial districts) and firms that are part of a

business group showed higher rates of survival during the Great Recession, compared to standalone firms.

However, standalone firms showed higher growth rates than group or cluster firms, showing that, during the crisis the softening of the selection effect prevailed over the supporting effect. In the case of business groups, this applies to sales growth, while the supporting role of group or cluster membership prevails in the case of firm profitability.

This mechanism is similar if we consider firm age. Age has a positive effect on survival during the crisis; older firms were more resilient than younger firms. This means that only the best performing younger firms survived, resulting in a positive relation between age and performance.

This paper has some very general – and in our view, interesting – implications. Networking forms, such as clusters and business groups, reduce the selection effects produced by the market mechanism and allow the survival of poorly performing firms. This is particularly relevant during periods of economic and financial crises. It means that, market mechanisms and firm organizational forms can have opposing effects on the level of efficiency of a production system. In the short-run, groups and clusters may have a negative effect of efficiency by allowing poorly performing firms to survive. However, this can result in loss of production knowledge and productive resources, which might be valuable in a long-run perspective.

One of the limitations of this study is that we analysed economic and financial data for manufacturing firms only because we expect the effect of local clustering and networking to be stronger for manufacturing firms. However, it would be interesting to analyse to what extent the results of this analysis hold for other sectors.

A further development to this research would be to analyse the mechanisms used in business groups to support affiliated firms, and the mechanisms observed in local clusters that contribute to reducing the selection effect imposed by tight market conditions. In the case of business groups, these mechanisms are related mainly to the functioning of the internal capital market, while in the case of local clustering commercial relations among firms can be expected to dominate.

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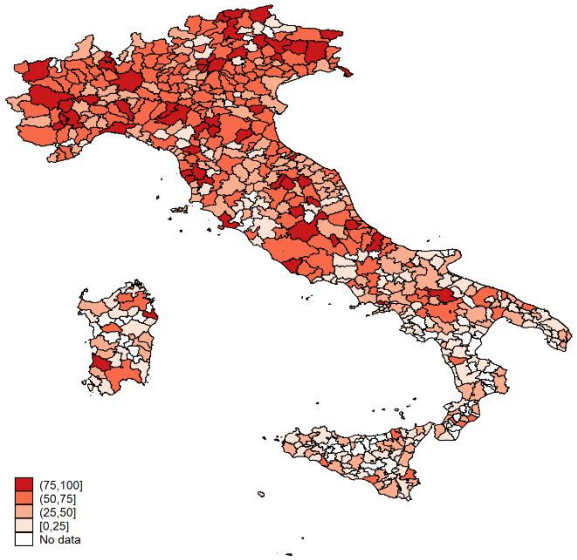
Figure 1 – Share of employees in business groups by local labour systems

Total local labour systems



Industrial districts

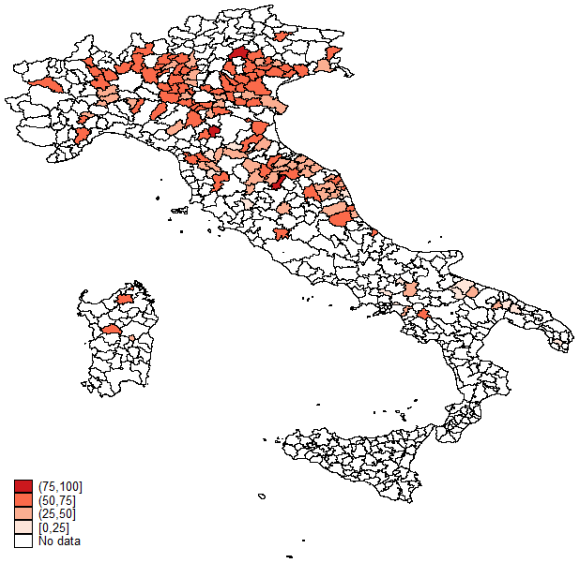


Table 1 - Variables

ROA	profitability: return on assets
sales_growth	yearly variation of sales (%)
surviving	dummy=1 if a firm survives at least for three consecutive years
district	dummy=1 if a firm is located in an industrial district
group	dummy=1 if a firm belongs to a business group
len_debt	the length of debts towards suppliers *(in days)*
output	value of firm output *(thosands of EURO)*
age	2012-year from foundation *(years)*
bank_loan	ratio between bank loans and total assets
cost_out	ratio between cost of goods and services and total production costs
SP	specialized suppliers sector
SB	science based sector
SI	scale intensive

DS	dominated supplier sector

Table 2 - Descriptive statistics*

Variable	Mean	Std. Dev.	Min	Max
ROA	0.026	0.135	-1	1
sale_growth	0.009	0.644	-9.54	10.05
surviving	0.713	0.452	0	1
group	0.180	0.384	0	1
district	0.368	0.482	0	1
age	17.6	14.1	0	158
output	7,726.6	103,189.4	1	21,000,000
cost_out	0.633	0.229	0	1
bank_loan	1.072	17.31	0	5,731.9
len_debt	48.93	230.9	0	7,265

*See above (Table 1) for the units of measurement.

Table 3 - Descriptive statistics*

	Standalone firms					Firms belonging to business groups				
Variable	**N. obs**	**Mean**	**Std. Dev.**	**Min**	**Max**	**N. obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
ROA	726,27	0.026	0.139	-1	1	181,997	0.028	0.119	-1	1
sale_ growth	502,43	0.003	0.650	-9.54	8.31	132,085	0.035	0.616	-9.49	10.05
surviving	1,021,368	0.697	0.459	0	1	225,336	0.783	0.412	0	1
district	1,021,368	0.366	0.482	0	1	225,336	0.376	0.484	0	1
age	1,019,784	16.84	13.47	0	158	225,176	20.89	16.15	1	148
output	621,958	2,524.6	17,480.2	1	5,100,000	158,332	27,668.3	225,325	1	21,000,000
cost_out	653,992	0.624	0.233	0	1	165,735	0.669	0.211	0	1
bank loan	732,332	1.128	18.662	0	5,731.86	182,928	0.846	10.283	0	1,552.75
len_debt	595,970	33.52	204.66	0	7,265.24	152,027	109.4	305.95	0	7,230.94

*See above (Table 1) for the units of measurement.

Table 4 - Correlation matrix

	group	ROA	sale_growth	surviving	cost_out	bank_loan	age	district	len_debt
group	1.000								
ROA	0.003	1.000							
sale_growthh	0.020	0.218	1.000						
surviving	0.0728	0.169	0.0034	1.000					
cost_out	0.079	0.175	0.1762	0.1571	1.000				
bank_loan	-0.0065	-0.053	-0.0242	-0.0349	-0.0165	1.000			
age	0.1104	0.016	-0.0885	0.2046	0.0500	-0.0016	1		
district	0.0076	0.017	-0.0007	0.0373	0.0601	-0.0022	0.02	1	
len_debt	0.009	-0.079	-0.0243	-0.0036	-0.0116	0.0022	0.00	-0.0044	1

Table 5 - Share of turnover (%) for standalone firms and business groups located in industrial districts

District*	**Group****		
	0	**1**	**Total (%)**
0	22.7	77.3	100.0
1	34.7	65.3	100.0

* District=0 denotes firms not belonging to industrial districts; *viceversa* District=1.
**Group=0 denotes firms not belonging to business groups; *viceversa* Group=1

Table 6 - Determinants of the probability of surviving

DEPENDENT VARIABLE:	**Probability of surviving**	
Estimation method:	Probit	IV-LPM
	[1.]	[2.]
group	0.195*** [0.016]	0.477** [0.201]
district	0.061*** [0.012]	0.041*** [0.011]
ln(bank_loan)	-0.497*** [0.023]	-0.030*** [0.011]
ln(len_debt)	-0.049*** [0.002]	-0.024*** [0.007]
ln(cost_out)	0.099*** [0.009]	0.031*** [0.008]
ln(age)	0.586*** [0.007]	0.089*** [0.007]
ln(output)	0.124*** [0.003]	-0.021 [0.015]
SS	0.082*** [0.013]	0.0007 [0.006]
SB	0.077*** [0.026]	-0.020 [0.016]
SI	0.052*** [0.012]	-0.001 [0.004]
DS	Ref.	Ref.
Regional dummy	Yes	Yes
Time dummy	Yes	Yes

N. Obs.	597,585	520,457
R^2	0.187	…
Hansen J statistic (p-value)	…	0.505
Wu_Hausman test (p-value)	…	0.000
Durbin-Wu-Hausman test (p-value)	…	0.000

*** significant at 99%; ** significant at 95%; * significant at 90%; standard errors are clustered.

Table 7 - Determinants of firm's performance

DEPENDENT VARIABLE:	ROA	Sales growth
Estimation method:	IV	IV
group	0.288*** [0.032]	-0.934*** [0.022]
district	-0.069*** [0.016]	-0.026*** [0.008]
ln(bank_loan)	-1.545*** [0.022]	-0.201*** [0.007]
ln(len_debt)	-0.043*** [0.001]	0.003*** [0.001]
ln(cost_out)	0.033*** [0.005]	0.077*** [0.003]
ln(age)	-0.248*** [0.003]	-0.221*** [0.002]
ln(output)	-0.009** [0.003]	0.160*** [0.002]
SS	0.147*** [0.004]	0.037*** [0.002]
SB	0.165*** [0.008]	0.090*** [0.004]
SI	0.0]005 [0.004	0.011*** [0.002]
DS	Ref.	Ref.
Regional dummy	Yes	Yes
Time dummy	Yes	Yes

N. Obs.	384,472	412,577
R^2	0.092	0.129
VIF	…	…
N. replications	500	500
Hansen J statistic (p-value)		
Wu_Hausman test (p-value)	0.000	0.000
Durbin-Wu-Hausman test (p-value)	0.000	0.000

*** significant at 99%; ** significant at 95%; * significant at 90%; standard errors are clustered or bootstrapped.