Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 110 (2014) 8 – 19

Procedia
Social and Behavioral Sciences

Contemporary Issues in Business, Management and Education 2013

Local agglomeration economies: what impact on multinational and national Italian firms' survival?

Anna Maria Ferragina[a*], Fernanda Mazzotta[a]

[a]*Department of Economcs and Statistics and CELPE, University of Salerno, Via Giovanni Paolo II, 132 84084- Salerno (SA) (Italy)*

Abstract

The aim of this paper is to analyze the determinants of firm survival devoting special interest to local agglomeration economies and to their different impact on multinational and national Italian manufacturing establishments. We use a large unbalanced micro-panel data set made of 884232 observations including both new and incumbent corporate firms. Data are disaggregated by firm, sector, and province and concern manufacturing firms localized in the 110 Italian provinces over 2002-2010. We employ semi-parametric Cox hazard models to explore the determinants of duration between a firm´s start-up and its cessation of economic activity focusing on the role of urbanization economies, local industrial clusters, industry specialization, intra and extra-industry variety, respectively for multinational and national firms.

Keywords: duration analysis; foreign multinationals; international trade; finance; investment; business; firm performance; size and spatial distributions of regional economic activity.

1. Introduction

The focus of our contribution is to explore the determinants of the survival of Italian manufacturing establishments devoting special interest to local agglomeration economies (Cainelli, Montresor, & Vittucci Marzetti, 2012; Fritsch, Noseleit, & Schindele, 2010), and to firms' global investment. We consider foreign multinationals in Italy and Italian firms' investing abroad to try to catch the role of multinational activities, which recent studies have

* Corresponding author. Tel.: 00393495870721
E-mail address: aferragina@unisa.it

doi:10.1016/j.sbspro.2013.12.843

strongly confirmed to be crucially related to firms dynamics and growth (Wagner, 2011; Altomonte, Aquilante, & Ottaviano, 2012).

The empirical application of our research refers to the Italian economy, where the geographical distribution of firms is historically characterised by a persistent social-economic dualism between the more advanced North and centre and the backward and less industrialised South. This divide has important consequences for the process of firm and industry dynamics (see Audretsch, Santarelli, & Vivarelli, 1999). Italy is also one of the most popular country for agglomeration economies and industrial districts. However, recent empirical studies on the Italian industrial districts have strongly questioned that district firms show the superior resilience they had in the past (Bugamelli, Cristadoro, & Zevi, 2009; CENSIS, 2010; Iuzzolino & Micucci, 2011).

The probability of firm exit is modeled as a function of different determinants related to agglomeration economies by considering at province level: population density, local industrial clusters, industry specialization (Balassa index by ateco91 2 digit), intra-industry and inter-industry variety, following the recent contribution by Frenken, Van Oort, & Verburg (2007), which distinguishes between related and unrelated variety by using Theil entropy index. Global activities are related to inward foreign investment and to domestic firms investing abroad. We also control for other standard variables in duration models at firm (size, productivity, capital intensity, labour cost), industry (export and FDI intensity, market barriers to entry such as minimum efficient scale and market concentration, Pavitt clusters and sector technology classes) and at province level (death rate, start up rates, innovation, export propensity, wage costs, labour productivity, value added growth, unemployment rates). We employ semi-parametric hazard models that are specifically designed to analyze duration phenomena to ascertain survival determinants by explaining the time period between a firm´s start-up and its cessation of economic activity. The variables related to firm internationalization, outward and inward foreign direct investment, allow us to take into account how the international linkages modify the impact of firm and industry characteristics and of local agglomeration economies.

The following section (Section 2) provides an overview on the literature hypotheses and empirical evidence with regard to the factors that may determine the survival of businesses. Section 3 introduces the data, section 4 the estimation procedure, as well as the basic definitions of variables and the expected signs. The results of the empirical analysis are presented in Section 5 and the final section (Section 6) concludes.

2. Background of the literature

There has been an exceptional surge of interest in firms' dynamics over the last twenty years following seminal studies (Dunne, Roberts, & Samuelson, 1988; Audretsch, 1991). A recent family of contributions explores the relationship between firm dynamics and global activities related to FDI, trade and migration (Görg & Strobl, 2003; Kimura & Fujii, 2003; Bernard & Sjöholm, 2003; Ozler & Taymaz, 2004; Esteve-Pérez, Manez-Castillejo, & Sanchis-Llopis, 2008; Wagner, 2012). The bulk of this literature mainly focuses on firm and industry specific determinants. Location specific determinants instead have been quite neglected in these studies. Only few recent studies have addressed the local dimension in the analysis of new venture creation (Carree, Santarelli, & Verheul, 2008; Verheul, Carree, & Santarelli, 2009), of firm death rates (Cainelli, Montresor, & Vittucci Marzetti, 2012; 2013; Santarelli, Carree, & Verheul, 2010) and of firm survival (Fritsch, Noseleit & Schindele, 2010). The investigation of local determinants is crucial in the analysis of firm survival. Diversity of firms that compose industries and the specificities of the space in which the firms are located are strongly interconnected: a sector and firm specific factor might have a positive impact on the survival rate of the firms in a certain location and a negative one in another one (Caianelli, Montresor, & Vittucci Marzetti, 2012). Besides, it is a widely investigated fact that economic activity tends to be clustered in space and that agglomeration economies and externalities can compensate for the negative effect of more intense local competition. Localization economies may arise from industry specialisation and from the Marshall-Arrow-Romer externalities. These are external economies available to the local firms within the same sector and may consist of availability of large labor markets and specialized workers, and spatial proximity of large numbers of customers as well as of other firms in the industry that may facilitate knowledge spillovers (Porter, 1998). Hence, the higher specialization in the region might entail larger "Smithian" advantages in terms of learning-by-doing and industry spillovers (Caianelli, Montresor, & Marzetti, 2012). However, over-specializing might have a counter-effect too because it may locks its firms in production patterns which are caught by negative sector-specific shocks of technological or demand nature. Unlike the Marshall-Arrow-Romer

(MAR) model which focuses on spillovers among firms within an industry, Jacobs (1969) indicated that diversity of industries and knowledge spillovers across geographically close industries promotes innovation and growth via economic knowledge-inter-industry spillovers (Acs, Armington, & Zhang, 2007). Such externalities are available to all local firms and arise from sectoral variety. Caianelli, Montresor, & Vittucci Marzetti (2012) underline how the more unrelated are the sectors a region is involved in, that is the higher its "unrelated variety", the more the region may follow a portfolio strategy which could reduce its firm mortality in front of sector specific shocks. Besides, the more the local sectors are themselves varied within them, in terms of sub-sectors (higher "related variety") the higher will be the chances of knowledge spillovers with positive effects on firms' longevity. Among local factors a crucial role is also played by industrial districts (ID). ID are spatial agglomerations of mostly small and specialized firms, performing complementary activities and embedded in a network of social and economic relations of trust, co-operation and competition (Becattini, 1990; Sforzi, 2009). However, the geographical overlapping in ID may make firms use similar resources and local competition/selection higher especially in terms of the cost of resources (e.g. labour). Furthermore, inter-firm production linkages enable inter-firm credit relationships, which can act both as a risk-sharing mechanism and as a crisis contagion spreading mechanism, depending on the kind of turbulence the ID is exposed to (Battiston, Gatti, Gallegati, Greenwald, & Stiglitz, 2007; Gallegati, Greenwald, Richiarim, & Stiglitz, 2008; Caianelli, Montresor, & Vittucci Marzetti, 2012). The spatial agglomeration effects have been largely studied in regional growth and urban development studies (e.g. Glaeser, Kallal, Scheinkman, & Shleifer, 1992; Henderson, Kuncoro, & Turner, 1995). The empirical evidence is rather mixed. While several studies found evidence for positive effects of being located in an agglomeration on firm survival (Keeble & Walker, 1994; Fotopoulus & Louri, 2000), other studies (Audretsch & Vivarelli, 1995) identified a significant negative impact.

In the investigation of the local determinants of firm survival it is also crucial to take into account the strong heterogeneity of behavior between national and multinational firms. On the one hand, following the New-New Trade Theory multinational enterprises are more productive, have higher technological, managerial and human capabilities and, therefore, have higher capacity to face adverse external conditions (Melitz, 2003). It is a stylised fact in this literature that multinational firms (i.e. firms that have a foreign participation or that are controlled by a foreign owner) are a more complex category of internationalization that corresponds to the most productive group of firms (see Wagner, 2011 for a detailed survey; Altomonte, Aquilante, & Ottaviano, 2012). Secondly, investing abroad can be a form of risk diversification through spread of sales over different markets with different business cycle conditions. Besides, MNEs have access to both internal and international financial markets, which allows them to diversify their sources of financing and the associated risks. This means that they are less dependent on host capital markets in their operations. Furthermore, they are also less linked to the host country by means of input sourcing from local upstream firms. Finally, the local market is often less important for their sales, being multinationals generally more export intensive than domestic firms (Godart, Görg, & Hanley, 2012). Recent case studies have been examined for Canada (Baldwin & Yan, 2011), Denmark (Eriksson, Smeet, & Warzynski, 2009), Japan (Kimura & Kiyota, 2006), Spain (Esteve-Pérez, Manez-Castillejo, & Sanchis-Llopis, 2008), Sweden (Greenaway, Gullstrand, & Kneller, 2009) Italy (Amendola, Ferragina, Pittiglio, & Reganati, 2012; Ferragina, Pittiglio,& Reganati, 2010; 2012).

These arguments lead us to expect quite different impact of local determinants on firm survival of multinational firms with respect to purely national ones.

3. Data

We draw our dataset on different sources. Our main information come from the commercial data provider Aida (by Bureau Van Dick, BVD) which allows us a wide coverage of Italian manufacturing corporate enterprises. We also use the "2001 Italian Industrial census" of the Italian National Statistical Institute (ISTAT), the yearly series of "Provincial Accounts"(Conti Provinciali) of ISTAT, and "Movimprese Archive" of the Italian Chamber of Commerce (Uniocamere). The analyses are restricted to the manufacturing sector since the service industries represent a different case that should be analyzed separately. Further information on international activities such as FDI, export, and import information at industry level are drawn from aggregate databases by Eurostat and ISTAT and by the Italian Patent Office. We build up a large unbalanced panel of data of 884232 for the manufacturing,

disaggregated by firm, sector and province, covering 9 years (from 2002 to 2010). Our dataset includes both new firms and incumbent ones.

The following procedure was used to identify firm exit. We consider a firm to have exited if its legal status variable in the AIDA dataset is failure, liquidation, or bankruptcy. We consider the time of exit as the time when a firm enters a liquidation or bankruptcy process, whichever starts earlier. To accurately identify the timing of any legal cessation of a firm's activity, we complement these variables by checking the balance sheet data. We assign firm exit as the year in which the firm reports its last sales. We further control for firm status by also considering AIDA information on the type of procedure a firm is undergoing. This last piece of information allows us to avoid counting firms with changes in categories due to mergers, acquisitions, or changes in location or sector as exited, and ensures that our data represent "true exit".

Fig. A.1 in Appendix shows the geographical pattern of firm exit in our sample in 2009. There are pronounced differences in the death rates at province level which strongly indicate the importance of local factors. The survival rates were much lower in the southern part of the country, particularly high death rates are found in the Campania region around Naples, in Sicily (almost spread equally across the provinces), Calabria (here with some bright area), Abruzzo (almost entirely), Puglia (Gargano). This spatial pattern seems to strongly confirm a North-South divide while the difference East-West are not so clear-cut. This picture matches quite well with the peculiarity of the Italian productive structure where in the North-West, firms are endowed with higher levels of technological capability than other areas of Italy; in the North-East and in the Centre, many firms belong to the 'industrial district model'; in the South, a less industrialised economy prevail. Except for the highly agglomerated areas in the north east part, death rates appear to be lower in urbanized areas such as Milan, Florence, Genova.

4. Estimation methodology

We use survival duration model that allows to control for both the occurrence of an event (i.e., the failure of a firm) and the timing of the event (i.e., the elapsed time till the failure took place). The advantage of the hazard models is that they are able to address the presence of censored data. Since in most cases, a number of firms in the sample will not have failed during the period of analysis, the information on their life-span is incomplete and right censored. In this case, applying conventional statistical methods may result in biased and inconsistent estimates (Mata & Portugal, 1994). The hazard model is specifically designed to deal with this problem. We specifically use a continuous Cox's proportional hazard models (CPHM) that is quite commonly used in the literature on firm survival (e.g., Audretsch & Mahmood, 1995 and other seminal studies such as Görg & Strobl, 2003; Mata & Portugal, 1994).

The hazard function $h_{ij}(t)$ is given by:

$$hij(t) = hij(t)\exp(Xijt\beta) \quad (1)$$

This function defines the probability of exit in period t given that it has survived until t-1 and conditional on a vector of time varying covariates, where $h_j(t)$ is the industry-specific baseline hazard function, X is a vector of explanatory variables, and β is a corresponding vector of coefficients. The β parameters are estimated by the maximisation of the partial likelihood function, which does not require the specification of $h_j(t)$. Subscripts i, j, k and t denote "firm", "industry", province and "time", respectively. Note that the Cox proportional hazards model estimates the probability of the hazard, i.e., exit. Time is measured after entry, i.e., the time is equal to the age of the firm. The change in the hazard rate with age is incorporated into the underlying non-parametric hazard function, $h_j(t)$. Our estimations indeed include time, sector and geographic dummies for five geographical areas.

The underlying assumption of Cox's model is that the hazard function $h_{ij}(t)$ of a firm i, i.e., the rate at which firms exit at age t given that they have survived up to age $t-1$, depends only on the time at risk, $h_j(t)$ (the so-called baseline hazard), with the explanatory variables affecting the hazard independent of time, $exp(X_{ijt}\beta)$. The Cox proportional hazard model imposes the restriction that the hazard functions for different values of the explanatory variables are proportional to each other and that their coefficients are constant over time ("firm age" in our case, as we consider age length as the spell length). We tested the proportional hazards assumption for each explanatory variable using the

Schoenfeld test and found that the hypothesis of proportional effects is rejected only for the labour cost variable hence we interacted it with age.

We basically test for the role of specialisation and of diversity, i.e. whether firms get advantages from the proximity to firms that are related to the same industry (localization and Marshallian specialisation economies) and whether, also diversity of actors and hence Jacobian economies matter. We also explore the role of Industrial Districts (ID), a further separate determinant of firm mortality, distinct from the simple agglomeration determinants also because of the pivotal role social elements have in ID (Mazzanti, Montresor, & Pini, 2009).

Fritsch, Noseleit & Schindele (2010) adopted a multidimensional approach to the analysis of survival combining firms, industry and location specific determinants of manufacturing firms mortality. Our study is in the wake of this contribution. However, with respect to it we also consider firm internationalization by foreign direct investment. The expected relationship between the status of domestic/foreign multinationals (*foreign multinational*, *domestic multinationals*) and firm survival is ambiguous. Multinational enterprises (MNEs) are the most productive group of firms (see Wagner 2011 for a detailed survey; Altomonte, Aquilante, & Ottaviano, 2012). However, counter arguments are that MNEs, having an international production network, can move production facilities easily between different countries (the "footloose behaviour" hypothesis). In order to take into account of the strong heterogeneity between multinational and non-multinational firms we split our sample across these two firm subsamples.

The variables included in our analysis belong to three dimensions:

- Firm level:
    - size, age, productivity, labor cost, capital intensity, profit margin
    - outward and inward foreign direct investment: Italian multinationals, foreign multinationals (dummies)
- Industry level:
    - Industry export intensity, FDI intensity
    - Minimum efficient scale, Herfindhal index of concentration
    - Pavitt clusters, tech classes (OCSE taxonomy)
- Province (industry) level:
    - Value added growth, innovation (patents), unit labour cost, labour productivity.
    - Agglomeration economies:
        - Urbanisation economies: population density.
        - Districtualization degree of the provinces in 2001: number of workers in local labour market systems (Istat, based on Sforza classification), divided by the total manufacturing employment in the province.
        - Localisation economies: Balassa index of specialization.
        - Jacobs externalities: related variety, intraindustry variety, diversification (unrelated variety).

Table 1 provides a detailed description of firm and industry level variables and of the expected sign. At the firm level we use the following variables: size (measured by four classes of firm's total sales (*ricavi 4_1 , ricavi 4_2 , ricavi 4_3 , ricavi 4_4)* which allows us to avoid classifying most firms as "small" because of the high skewness of the Italian firms' distribution, *lproductivity*, *llabor cost*, *capital intensity*, *pre_tax_proft margin*. These give rise unambiguously to an expected reduction in the hazard.

Table 1. Description of our firm, industry and province level variables

CATEGORY	VARIABLES	DESCRIPTION	SOURCE	Expected Relationship with firm failure risk
		FIRM LEVEL COVARIATES		
	SIZE	Firm size measured by sales.	AIDA	-
	SIZE CLASSES	Dummy for 4 size classes based on sales: ricavi 1=sales below 25th percentile; ricavi2=from 25 to50th percentile; ricavi3= sales from 50 to 75th percentile; ricavi4=sales more than 75th percentile.		
	AGE	Firm age measured by the number of years since establishment.	AIDA	-
	PRODUCTIVITY	Firm productivity measured by value added per employee.	AIDA	-

	WAGE	Ratio between total personnel cost and total employment.	AIDA	-
	CAPINTENSITY	Real capital stock on employees.	AIDA	-
	PROFIT MARGIN	Pre tax profit margin. Proxy for mark up.	AIDA	-
INTERNATIONALISATION VARIABLES	OUTFDI	Domestic multinational ownership dummy that takes on the value 1 if the firm is an Italian owned-MNE, 0 otherwise.	AIDA	+/-
	INWFDI	Foreign ownership dummy that takes on the value 1 if the firm is foreign-owned, 0 otherwise.	AIDA	+/-
		INDUSTRY LEVEL COVARIATES		
	EXPSHARE	Ratio of 3 digit Ateco 2007 industry j's total exports over total output in year *t*.	ISTAT	+/-
	FDI SHARE	Val_prod_ind_for_b/val_prod_ind_tot	ISTAT	+/-
	MES	Minimum efficient scale of the industry measured as the ratio of firms' sales above the average sales for the industry to total industry sales (Comanor and Wilson 1967).	AIDA	+/-
	HERF	Herfindahl index of turnover by 2 digit Ateco, a proxy for the level of concentration within the sector is built as the sum of the squares of the turnover of all firms within a particular industry at the 2-digit Ateco level.	AIDA	+/-
	TECH CLASS	Technology macrosector dummies *(*TECH CLASS LOW for firms belonging to low and medium-low technology sectors and TECH CLASS HIGH for firms belonging to medium-high and high technology sectors (OECD taxonomy).	OECD	+/-
	PAVITT CLUSTERS	Dummies for Pavitt clusters: Pavitt 1=Traditional; Pavitt 2=Specialised suppliers; Pavitt 3= Scale based; Pavitt 4= Science based.		+/-
	ATECO SECTORS	2 digit Ateco 1991 and 2 digit Ateco 2007 classification dummies..	ISTAT	
		PROVINCE LEVEL COVARIATES		
	wage_ula	Unit labour cost at constant prices (2001)	ISTAT	+/-
	growth	Manufacturing value added (VA-MAN) growth =(VA_MAN-VA_MAN(-1))/VA_MAN(-1) (2002-2009)	ISTAT	-
	prod_lav	Value added per employee (000 euros current prices)	ISTAT	-
	patent2	Registered trademarks net of renewed ones per active firm (MARCHI_TOT-MARCHI_RIN)*1000/ATTTOT2C(2011)	Ufficio Italiano Brevetti (2011)	+/-
	patent3	Patents per active firm (BREV_EPO*1000/ATTTOT_D) (2002-2009)	Patent Italian Office (2011)	+/-
	population density	Number of inhabitants per squared kms (province, 2002-2009)	ISTAT	+/-
	ind_spec	industry specialization (Balassa index of sector i ateco91 2 digit and province k) $IS_{i.s} = \frac{(\frac{L_{i,s}}{\sum_s L_{i,s}} 2001)}{(\frac{\sum_i L_{i,s}}{\sum_{is} L_{i,s}} 2001)}$.	ISTAT	+/-
	add_dist	Employment share in industrial districts in 2001 (employees share in LLS of SMEs in 2001) on total employees in the province (%)	ISTAT	+/-
	H	Index of intra industry variety (Ateco91 2 digit e 5 digit) see Cainelli et al., 2010 (Entropy of the two-digit sector i in province s in 2001 (Hi,s,2001), where pg,s,2001 is the share of workers employed in the five-digit sector g in province s on the total number of workers in province s, and $P_{i,s,2001}(=\sum_{g\in S_i} P_{g,s,2001})$ is the same fraction	ISTAT	-

	computed with respect to the two-digit sector i, which the sub-sector g belongs to. $-\sum_{g \epsilon Si} \frac{P_{g,s,2001}}{P_{i,s,2001}} \log_2 \left(\frac{P_{g,s,2001}}{P_{i,s,2001}} \right)$		
un_var	Entropy index of unrelated variety (ateco91 2 digit) following Cainelli *et al.*, 2010 Entropy computed at the two digit level in province s for sectors different from i in 2001 $-\sum_{j \neq i} P_{j,s,2001} \log_2 P_{j,s,2001}$	ISTAT	-
rel_var	entropy index of related variety (Ateco91 2 digit e 5 digit) see Cainelli *et al.*, 2010 Weighted sum of the entropy computed for each two-digit sector in province s during 2001. $-\sum_{i} P_{i,s,2001} H_{i,s,2001}$	ISTAT	-

Table 1 also describes our province level variables and the expected sign. Value added growth (*growth*) can also be regarded as an indicator for the overall economic strength of the province in which a new business is located. *Unemployment rates* serve as an indicator of local demand. Since prospering demand should be conducive to the survival of new businesses we expect a positive effect on the hazard risk. A high level of innovative activity in a region (e.g., measured by the share of patents and trademarks, *patent2, patent3*) could be conducive to higher business survival due to a high level of regional spillovers. Survival chances should be relatively low in industries which are characterized by high labor unit costs (*llaborcost*) because of problems to obtain profitability. We control this by also including labour productivity at province level (*prod_lav*).

For agglomeration economies we take into account several types of indicators: urbanisation economies measured by *population density*; districtualization degree of the provinces in 2001 (*add_dist*) measured by the number of workers in local labour market systems (provided by Istat, based on Sforza classification); localisation economies measured by the Balassa index of specialization *(ind_spec*); furthermore, we measure the Jacobs externalities following the indicators introduced by Frenken, K., Van Oort, F., & Verburg, T. (2007) and also adopted by Cainelli, Montresor, & Vittucci Marzetti (2012). These are based on several measures of variety: related variety (*rel_var*), intraindustry variety (*H*), diversification or unrelated variety (*un_var*). For the arguments discussed in the section devoted to the literature survey, we have mixed expectations about the role of urbanization, specialization and degree of district economies, conversely, theoretical arguments support a positive role of Jacobians diversification economies.

For the industry level covariates and the ambiguous expected sign we refer to Table 1.

We performed a correlation matrix among all the variables and we carried out the variance inflation factor (VIF) in order to check for multicollinearity: all values are lower than 2.5, thus demonstrating the absence of multicollinearity among regressors (Oerlemans & Meeus, 2005).

5. Estimation results

Our estimation results are in presented in Table 2. A first insight about the role of agglomeration economies is that we do not get any evidence of a significant impact of the urbanization economies of the provinces in reducing the firm mortality of their industries. This is quite surprising as the denser the province's population, the more the firms of its industries should be able to find incentives and mechanisms which help support their activities and resist negative events (i.e. training and education facilities, infrastructures, credit facilities). However, the literature provide ambiguous evidence on this: Cainelli, Montresor, & Vitucci Marzetti (2012) find a positive impact while Fritsch, Noseleit, & Schindele (2010) a negative one.

The results about the district degree of the provinces are mixed. For the multinational firms they support the prediction of the ecological-evolutionary approach, claiming for a higher firm mortality due to higher competition for the ID local resources. However, for the entire sample and for the non-multinational firms, the district degree of a province does not seem to have any impact on the firm mortality of its industries. Cainelli, Montresor, & Vitucci

Marzetti (2012) find that the district degree of a province, taken as alone, does not seem to have any impact on the firm mortality of its industries. Indeed, the relative variable gets significant, and with a negative sign, when interacted with the intra-industry variety. They conclude that IDs are safer place for firms in locations with lower intra-industry variety.

A third important and somehow unexpected insight is given by the non-significant coefficient we find on localisation economies proxied by the Balassa index of specialization. This is actually against the expectation that a higher sector specialization entails higher Marshallian externalities whose productivity effects should actually reduce the firms' exit rate. However, our result is partially in line with other recent empirical evidences: Fritsch, Noseleit, & Schindele (2010) conclude that regional specialization in a certain industry has a negative effect on survival chances up to a certain point and are not significant after that. Cainelli, Montresor, & Vittucci Marzetti (2012) find a significant U-shape relationship between the firm death rate in the Italian provinces over the retained period and their initial industry specialization. This might depend on the fact that specializing in a certain sector exposes the firms of a local system to an excessive competitive pressure and to the risk of organizational inertia, and thus increases their mortality.

A fourth and important finding comes from the results of the variety indicators: intraindustry variety, related variety, and diversification or Jacobian externalities, measured by the unrelated variety. We observe that for non-multinational firms "internal" variety of the industrial sectors of one province i.e. the intra-industry variety is able to reduce firm mortality quite strongly. Hence, diversity of the activities within each industry may be interpreted as a source of intra-industry spillovers of which firms benefit. A negative impact on the firm mortality of one local industry is also played by its diversity with respect to the other industries of the same province – the unrelated variety of the whole province at the industry level. Both the intra-industry indicators of variety and the unrelated variety of the whole province allow a portfolio strategy of diversification in front of sector specific shocks.

To sum up, with respect to the key questions of our analysis, the role of local factors in shaping firm survival and how they interact with multinational status of firms we get the following picture. First of all, our results show that regional industry specialization is not enhancing the survival of firms in a respective industry. Hence, within-industry and geographically urban concentrated competition are both not conducive to increased firm survival. Our results suggest that in Italian manufacturing industries survival chances are forces that should tend to reduce geographic concentration. These results contrast with the findings of Dumais, Ellison, & Glaeser (2002) who discovered that closure is less likely in those regions that belong to the geographic centres. As for diversification (Jacobians) economies at province level they significantly increase firm duration both within and between industry for national firms while multinationals do not seem to get any beneficial effect. Hence our results are not confirming the standard results on the role of the core specialization of the Italian local systems, while conversely we find important across-industry spillovers for firm survival far from the core specialization sectors but only for non multinational Italian firms. Besides, no evidence is found of a positive district effect on survival. Furthermore, in the case of multinationals we also find evidence of a negative impact of the industrial district degree of the province.

We also controlled for the start-up and death rates in the sector, the export propensity and the manufacturing share of the province but these variables were not significant.

Table 2. Estimation results: Cox hazard estimates for all firms, non multinationals and multinationals

	Full sample (a)	Non multinational firms (b)	Multinational firms (c)
ricavi4_1	1.006***	0.986***	2.073
	(0.212)	(0.215)	(1.510)
ricavi4_2	0.419**	0.408**	-42.23
	(0.184)	(0.186)	(0)
ricavi4_3	0.157	0.146	-0.224
	(0.170)	(0.173)	(0.818)
Lproductivity	-0.429***	-0.434***	-0.665**
	(0.0463)	(0.0482)	(0.269)
Llaborcost	0.115*	0.122*	-0.0536
	(0.0618)	(0.0633)	(0.707)
Capintensity	-0.00146**	-0.00140**	-0.00185
	(0.000599)	(0.000599)	(0.00267)
own3	-0.678*		
	(0.403)		

foreign_owner	-0.151		
	(0.468)		
pre_tax_profit_margin	-0.00742***	-0.00713***	-0.0190***
	(0.00102)	(0.00103)	(0.00659)
Mes	-5.961	-5.254	17.91
	(10.63)	(10.82)	(22.92)
herind00	0.00365	0.000922	0.122
	(0.156)	(0.168)	(0.655)
exp_ateco07share	-0.314***	-0.321***	-0.269
	(0.112)	(0.115)	(0.299)
FDI_share_bymarket	1.501	1.550	1.625
	(1.130)	(1.149)	(16.14)
tech1_2	-0.459	-0.356	-24.22***
	(0.615)	(0.629)	(5.369)
pavitt_1	-0.264	-0.305	-21.51
	(0.448)	(0.462)	(0)
pavitt_2	0.468	0.411	2.618
	(0.356)	(0.372)	(3.946)
pavitt_3	-0.421	-0.473	-22.88***
	(0.434)	(0.447)	(1.337)
death_rate	-0.547	-0.511	-11.32
	(1.186)	(1.178)	(15.90)
startup	-0.880	-0.719	-35.37
	(2.052)	(2.042)	(40.16)
occ_man_share	1.618	1.493	28.74
	(1.726)	(1.747)	(54.58)
exp_prop	6.341**	5.947*	89.54
	(3.231)	(3.266)	(63.35)
growth	0.423	0.690	-37.12**
	(1.359)	(1.360)	(15.26)
patent2	-0.00140	-0.00136	0.0228
	(0.00185)	(0.00186)	(0.0431)
patent3	0.00932	0.0114	-1.053*
	(0.0158)	(0.0157)	(0.623)
densita_pop	-0.000000305	0.00000292	-0.00186
	(0.000114)	(0.000115)	(0.00451)
unemployrate	0.0368	0.0364	0.617
	(0.0307)	(0.0310)	(0.910)
inddist	-0.120	-0.128	-1.780
	(0.119)	(0.120)	(4.423)
add_dist	-0.0169	-0.0156	0.0497***
	(0.0145)	(0.0156)	(0.0180)
H	-0.177**	-0.190**	-0.375
	(0.0772)	(0.0787)	(0.850)
un_var	-0.672**	-0.630**	-2.350
	(0.298)	(0.303)	(2.526)
rel_var	0.425	0.412	2.113
	(0.488)	(0.499)	(3.998)
ind_spec	-0.161	-0.153	-0.788
	(0.124)	(0.126)	(2.224)
prod_lav	0.0673	0.0615	-0.832***
	(0.0766)	(0.0825)	(0.282)
dtime4	0.328	0.621	
	(0.671)	(0.734)	
dtime5	1.904***	2.166***	
	(0.736)	(0.835)	
dtime6	2.628***	2.930***	-41.84
	(0.750)	(0.851)	(0)
dtime7	2.860***	3.174***	-2.409*
	(0.754)	(0.853)	(1.252)
dtime8	3.019***	3.368***	-13.41**
	(0.778)	(0.871)	(5.273)
dtime9	3.564***	3.894***	-7.829
	(0.740)	(0.838)	(4.795)
t*llaborcost	-0.00816***	-0.00894***	-0.000296
	(0.00238)	(0.00254)	(0.0194)

N	233478	223040	10438
Loglikelihood	-3170.9124	-3095.5765	-28.495927
Wald test	745.57	717.20	27057.49
Prob>chi2	0.00000	0.00000	0.00000

Coefficient are reported. Standard errors in parentheses; $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Estimates are stratified by industries and we control for territorial areas by using geographic dummies.

The other findings we obtain are quite standard confirming that the probability of exit is lower for relatively larger businesses, more capital intensive and more productive firms and for establishments with above-average level of highly qualified employees. However, in the subsample of multinational firms, size and labour cost are not significant may be due to too low variability in the sample. It is quite interesting that firms in R&D more intensive industries and locations enjoy better survival prospects than businesses in other industries and provinces only if they are multinationals.

6. Conclusions

The main argument we tested is how agglomeration economies, in addition to industry and firm specific determinants, may provide an explanation for firm mortality. Moreover, we also tried to understand how local specific determinants play a different role according to whether firms are globalized or not. Our empirical analysis has the advantage of being applied to a large panel of firms and to be also disaggregated by the Italian provinces and by industrial sectors, over a long span of time (2002-2010).

Our results suggest three set of conclusion: 1) Benefits from geographically bounded spillovers seem to be of little importance or maybe are balanced by the counterforce of intensified local competition for survival; 2) Industrial districts economies do not increase firm duration and actually lower survival rates for multinationals; 3) Diversification economies within the area are quite relevant for non multinational firms but not for multinational firms. This might depend on the fact that these latter are able to benefit from portfolio strategies of market and production diversification at global level more than in the local economy. Our findings have interesting implications for the assessment of location-based policies. The role played by intra-industry and the extra-industry (i.e. unrelated) variety of the specialization patterns of the Italian provinces call for an important role of industrial policies aiming at extending and diversifying the economic activities of a local system. The same implication can be drawn from the results on the not significant role of the industry specialization of the Italian provinces. Besides, as concentration of activities in urbanized contexts do not impact positively maybe due to congestion and transition costs which offset other benefits, this provides a strong support for extending infrastructural policies beyond urban areas as an important tool for promoting the firms' longevity by reducing polarisation. A further important result for its policy implications concerns the firm mortality impact of the industrial district degree of the provinces which host them. Due to their negative effect on multinational firm mortality the question rise about whether IDs have lost the appeal they had in the past for foreign investors maybe because their competitive advantage has not evolved towards a model based on innovation and knowledge creation rather than on cost reduction strategies The relative policy implication is that industrial policy favoring the constitution and/or the viability of IDs, should consider the industry composition and the organization of the firm clusters on which they are based. Finally, it is also interesting to deepen the investigation upon our result that investing in innovation and operating in technological sectors extend the firm survival rate only for multinational firms.

Acknowledgements

We thank the participants at the 2013 Italian Association of Regional Science (AISRE) 2013 conference in Palermo for their useful comments and Giulia Nunziante for outstanding research assistance.

References

Acs, Z., Armington, C., & Zhang, T. (2007). The Determinants of New–firm Survival across Regional Economies. The Role of Human Capital Stock and Knowledge Spillovers. *Papers in Regional Science*, *86 (3),* 367–391. http://dx.doi.org/10.1111/j.1435-5957.2007.00129.x

Altomonte, C., Aquilante, T., & Ottaviano, G. I. P. (2012). The Triggers of Competitiveness, *The EFIGE Cross–Country Report,* Bruegel Blueprint n. 17.

Amendola, A., Ferragina, A., Pittiglio, R., & Reganati, R. (2012). Are Exporters and Multinationals firms more resilient over a crisis? First evidence for manufacturing Enterprises in Italy. *Economics Bullettin*, *32 (3)*, 1914–1926.

Audretsch, D., & Mahmood, T. (1995). New firm survival: new results using a hazard function. *Review of Economics and Statistics*, 77 *(1),* 97–103. http://dx.doi.org/10.2307/2109995

Audretsch, D. B. (1991). New firm survival and the technological regime. *Review of Economics and Statistics, 73 (4),* 520–526.

Audretsch, D. B., & Mahmood, T. (1995). New–firm survival: new results using a hazard function. *Review of Economics and Statistics*, *77 (1),* 97–103. http://dx.doi.org/10.2307/2109995

Audretsch, D. B., Santarelli, E., & Vivarelli, M. (1999). Start–up size and industrial dynamics: some evidence from Italian manufacturing. *International Journal of Industrial Organization, 17*, 965–983. http://dx.doi.org/10.1016/S0167-7187(98)00002-2

Baldwin, J., & Yan, B. (2011). The death of Canadian manufacturing plants: heterogeneous responses to changes in tariffs and real exchange rates. *Review of World Economics, 147 (1)*, 131–167. http://dx.doi.org/10.1007/s10290-010-0079-1

Battiston, S., Gatti, D. D., Gallegati, M., Greenwald, B., & Stiglitz, J. E. (2007). Credit chains and bankruptcy propagation in production networks. *Journal of Economic Dynamics and Control*, *31*(6), 2061 – 2084. http://dx.doi.org/10.1016/j.jedc.2007.01.004

Becattini, G. (1990). The Marshallian industrial district as a socio–economic notion. In F. Pyke, G. Becattini, and W. Sengenberger (Eds.), *Industrial Districts and Inter–Firm Cooperation in Italy* (pp. 37–51). Geneva: ILO.

Bernard, A.B., & Sjöholm, F. (2003). Foreign owners and plant survival. *NBER Working Paper 1003 (9)*.

Bugamelli M., Cristadoro, R., & Zevi, G. (2009). La crisi internazionale e il sistema produttivo italiano: un'analisi su dati a livello di impresa, Banca d'Italia, Occasional papers n. 58, Dicembre.

Cainelli, G., Montresor, S. & Vittucci Marzetti, G. (2012). Firms' death rate and spatial agglomeration. Evidence on the resilience of italian local Production systems. *Rivista di Economia e Statistica del Territorio*, Franco Angeli Editore, *2012 (3)*, 101–126.

Cainelli, G., Montresor, S. & Vittucci Marzetti, G. (2013). Spatial agglomerationa and firm exit dynamcs. *Small Business Economics*, forthcoming.

Carree, M., Santarelli, E., & Verheul, I. (2008). Firm entry and exit in Italian provinces and the relationship with unemployment. *International Entrpreneurial Mangament Journal*, *4*, 171–186. http://dx.doi.org/10.1007/s11365-007-0060-1

CENSIS. (2010). Congiuntura, competitivita' e nuove identita' dei distretti produttivi (Economic situation, competitiveness and new identity of the production districts). In O. N. D. Italiani (Ed.), I Rapporto Osservatorio Nazionale Distretti Italiani.

Comanor, W. S., & Wilson, T. A. (1967). Advertising, market structure, and performance. *Review of Economics and Statistics, 9 (4),* 423–440. http://dx.doi.org/10.2307/1928327

Dumais, G., Ellison, G., & Glaeser, E. L. (2002). Geographic Concentration As A Dynamic Process, *The Review of Economics and Statistics*, *84(2)*, 193–204. http://dx.doi.org/10.1162/003465302317411479

Dunne, T., Roberts, M. J., & Samuelson, L. (1988). Patterns of firm entry and exit in US manufacturing industries. *Rand Journal of Economics, 19 (4)*, 495–515. http://dx.doi.org/10.2307/2555454

Eriksson, T., Smeets V., & Warzynski, F. (2009). Small Open Economy Firms in International Trade: Evidence from Danish Transaction–Level Data. Aarhus School of Business Department of Economics Working Paper 09–7, March.

Esteve–Perez, S., Manez–Castillejo, J.A., & Sanchis–Llopis, J. A. (2008). Does a "survival–by exporting" effect for SMEs exist? *Empirica, 35 (1)*, 81–104. http://dx.doi.org/10.1007/s10663-007-9052-1

Ferragina A., Pittiglio R., & Reganati, F. (2012). Multinational Status and Firm Exit in the Italian Manufacturing and service sectors. *Structural Change and Economic Dynamics, 23*, 363–372. http://dx.doi.org/10.1016/j.strueco.2011.10.002

Ferragina, A., Pittiglio, R., & Reganati, F. (2010). The impact of FDI on firm survival in Italy. Proceeding of the 6th International Scientific Conference "Business and Management–2010 , May 13–14, 2010, Vilnius Gediminas Technical University.

Fotopoulos, G., & Louri, H. (2000). Determinants of hazard confronting new entry: does financial structure matter? *Review of Industrial Organization, 17 (3)*, 285–300. http://dx.doi.org/10.1023/A:1007862922531

Frenken, K., Van Oort, F., & Verburg, T. (2007). Related variety, unrelated variety and regional economic growth. *Regional Studies, 41(5),* 685–697. http://dx.doi.org/10.1080/00343400601120296

Fritsch, M., Noseleit, F., & Schindele, Y. (2010). Success or failure? Business industry and region specific determinants of survival a multi–dimensional analysis for German manufacturing. Paper presented at the ERSA conference 2010.

Gallegati, M., Greenwald, B., Richiardi, M. G., & Stiglitz, J. E. (2008). The asymmetric effect of diffusion processes: Risk sharing and contagion. *Global Economy Journal, 8 (3)*, 1–20. http://dx.doi.org/10.2202/1524-5861.1365

Glaeser, E., Kallal, H., Scheinkman, J., & Shleifer, A. (1992). Growth in cities. *Journal of Political Economy, 100 (1),* 126–152.

Godart, O., Görg H., & Hanley, A. (2012). Surviving the Crisis: Foreign Multinationals versus Domestic Firms. *The World Economy*, *35(10)*, 1305–1321, October. http://dx.doi.org/10.1111/j.1467-9701.2012.01485.x

Görg, H., & Strobl, E. (2003). 'Footloose' Multinationals? *Manchester School, 71 (1),* 1–19. http://dx.doi.org/10.1111/1467-9957.00331

Greenaway, D., Gullstrand J., & Kneller R. (2009). Live or Let Die? Alternative Routes to Industry Exit. *Open Economies Review, 20(3)*, 317–337. http://dx.doi.org/10.1007/s11079-009-9112-1

Greenaway, D., Gullstrand, J., & Kneller, R. (2008) Surviving globalization, *Journal of International Economics, 74 (2)*, 264–277. http://dx.doi.org/10.1016/j.jinteco.2007.08.005
Henderson, V., Kuncoro, A., & Turner, M. (1995). Industrial development in cities. *Journal of Political Economy, 103 (5)*, 1067–1090. http://dx.doi.org/10.1086/262013
Iuzzolino, G., & Micucci, G. (2011). Le recenti trasformazioni nei distretti industriali italiani, in II rapporto dell'Osservatorio Nazionale dei Distretti Italiani, Roma, febbraio 2011.
Jacobs, J. (1969). *The Economy of Cities*. New York, Vintage.
Keeble, D., & Walker, S. (1994). New Firms, Small Firms and Dead Firms: Spatial Patterns and Determinants in the United Kingdom. *Regional Studies, 28 (4)*, 411–427. http://dx.doi.org/10.1080/00343409412331348366
Kimura, F., & Fujii, T. (2003). Globalizing activities and the rate of survival: panel data analysis on Japanese Firms. *Journal of Japanese International Economies 17(4)*, 538–560. http://dx.doi.org/10.1016/j.jjie.2003.08.003
Kimura, F., & Kiyota, K. (2006). Exports, FDI and productivity: dynamic evidence from Japanese Firms. *Review of World Economics 142(4)*, 695–719. http://dx.doi.org/10.1007/s10290-006-0089-1
Mata, J., & Portugal, P. (1994). Life Duration of new Firms, *Journal of Industrial Economics, 42*, 227–246. http://dx.doi.org/10.2307/2950567
Mazzanti, M., Montresor, S., & Pini, P. (2009). What drives (or hampers) outsourcing? Evidence for a local production system in Emilia Romagna. *Industry & Innovation 16(3)*, 331–367.
Melitz, Mark J. (2003). The Impact of Trade on Intra–Industry Reallocations and Aggregate Industry Productivity. *Econometrica, 71(6)*, 1695–1725. http://dx.doi.org/10.1111/1468-0262.00467
Oerlemans, L., & Meeus, M. (2005). Do organizational and spatial proximity impact on firm performance? *Regional studies, 39 (1)*, 89–104. http://dx.doi.org/10.1080/0034340052000320896
Özler, S., & Taymaz, E. (2007). Foreign ownership, competition and survival dynamics. *Review of Industrial Organization, 31(1)*, 23–42. http://dx.doi.org/10.1007/s11151-007-9144-x
Porter, M.E. (1998). Competing Across Locations: Enhancing Competitive Advantage Through a Global Strategy. In M. Porter, (Ed.), *On Competition* (pp. 305–344). Harvard Business School, Boston.
Santarelli, E., Carree, M., & Verheul, I. (2010). Sectoral patterns of firm exit in Italian provinces. *Journal Of Evolutionary Economics, 2011 (21)*, 499–517.
Sforzi, F. (2009). Empirical evidence. In G. Becattini, M. Bellandi, & L. D. Propris (Eds.), *A Handbook of Industrial Districts* (pp. 323–342). Edward Elgar.
Verheul, I., Carree, M., &, Santarelli, E. (2009). Regional opportunities and policy initiative for new venture creation. *International Small Business Journal, 27(5)*, 608–625. http://dx.doi.org/10.1177/0266242609338757
Wagner, J. (2011). International Trade and Firm Performance: A survey of Empirical Studies since 2006. *IZA Discussion Paper n. 5916.*
Wagner, J., & Gelubke, J. F. W. (2011). Foreign Ownership and Firm Survival: First Evidence For Enterprise in Germany. *IZA Discussion Paper n.6207*, December.
Wagner, J. (2012). Exports, Imports and Profitability: First Evidence for Manufacturing Enterprises. *Open Economies Review 23(5)*, 747–765, Springer. http://dx.doi.org/10.1007/s11079-011-9235-z

Appendix A.

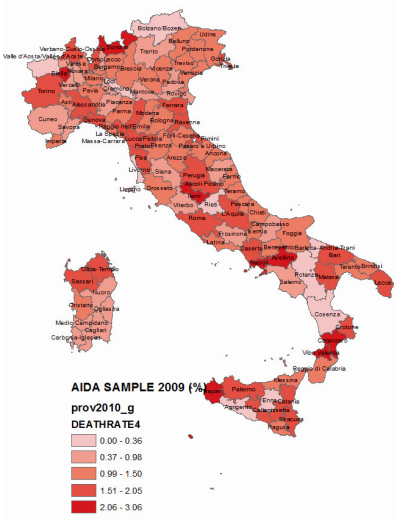

Fig. A.1. The geographic dimension: firm death rates by Provinces (2009): AIDA sample