**The width and depth of local exports: Spatial and cross-sectoral effects on firm entry, survival and growth**

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*Abstract*

Entrepreneurship is a localised process that relies on local institutions, resources, and networks. Interactions between agents in the space may have their origins in the domestic milieu, but they may also draw their roots from international economic linkages. Yet, there is a surprising lack of research that combines economic geography, international trade, and entrepreneurship literature to address these issues at the local level. Our study fills this gap by examining the effects of manufacturing export diversification (extensive margin) and specialisation (intensive margin) on firm entry, survival, and growth within and across cities and towns. Spatial econometric techniques are applied to firm population data from a small and open economy over the period 2007-2017. Extensive margin is identified as the main channel of influence on local entrepreneurial outcomes in manufacturing, but the impact on firm survival and growth in other localities is negative. Manufacturing export margins also impact entrepreneurial outcomes in other sectors of the local economy.

***Key words:*** *export specialization, export diversification, entry, survival, growth*

JEL classifications: R12, F14, L26, P25

1. **Introduction**

Firm entry, survival, and growth are among the most intensively studied entrepreneurship topics. A keyword search of the Web of Science reveals continuous increase in the number of studies addressing these topics from many economic and business aspects. However, these are often treated separately and thus do not comprehensively encompass the processes behind entrepreneurial dynamics. Scholars have known for decades that firm entry, survival, and growth depend on interactions among agents in space (Fotopoulos and Spence 1999; Armington and Acs 2002). Entrepreneurship is a localized process that relies on local institutions, resources and networks (Audretsch and Feldman, 1996; Audretsch and Lehmann, 2005;; Acs, 2008; Malecki, 2009; Coomes et al., 2012; Malecki, 2018). It is facilitated with social, cognitive, institutional, technological and organizational proximity among agents which are strongest in geographical proximity (Boschma, 2005).

The locally transmitted entrepreneurial resources may be of domestic and international origin. The participation in international markets creates knowledge spillovers, increases resilience to shocks, and opens new business opportunities (Melitz, 2003; Wagner, 2013). International trade literature recognised these externalities long time ago as intensive and extensive export margins (Hummels and Klenow, 2005; Helpman et al., 2008). Exporting along intensive margin provides specialised knowledge and technology spillovers while extensive margin can be associated with diversification of the local export structure, knowledge base and higher resilience to external shocks. However, the analyses of localised determinants of entrepreneurship did not pay particular attention to the nexus among economic geography, international trade and entrepreneurship literature. It is thus largely unknown whether and in what way knowledge transmitted along extensive and intensive export margins facilitates firm entry, survival and growth at local level.

The above issues are particularly relevant in the context of emerging economies. Policy makers promote entrepreneurship with the desire to spark growth and create new jobs. However, the ability to stimulate jobs and growth varies across different types of entrepreneurs. As Shane (2009) noted more than a decade ago, it is the high quality rather than the arbitrary entrepreneurs that have the highest growth and job creation potential. Structurally weak entrepreneurial systems in emerging economies lack proper resources to stimulate such entrepreneurial ventures, and spillover effects from learning through exporting could be key to promoting their entry, survival and growth. The recent cross-country study by Stojcic et al. (2020) has shown at the industry level that business creation and growth in such an environment are strongly influenced by trade (exports and imports) and global value chain linkages (GVCs). This calls for further research on the particular channels through which exports influence local entrepreneurial outcomes.

Our study seeks to address these gaps in literature by examining the impact of the local internationalization context on entrepreneurial outcomes within and across cities and towns of a small and open European Union (EU) member state. Specifically, building on the nexus among entrepreneurship, international trade and economic geography literature and using spatial econometric analysis we seek to investigate whether intensive and extensive manufacturing export margins affect local (at the level of cities and towns) shares of newly born, surviving and high-growth firms in the total population of firms. In addition, we also examine the effect of local manufacturing export margins on the entry, survival, and growth of firms in other parts of the economy. In this way, the study contributes to the ongoing debate on the potential of manufacturing to act as a driving wheel of economic development.

The analysis is based on a census of firms over the period 2007-2017 in Croatia, the most recent addition to EU member states. Delayed accession to the EU and almost three decades of misaligned economic policies left devastating economic effects on the Croatian economy that resulted in severe deindustrialization and uneven spatial distribution of economic activity (Stojčić et al., 2018). As a small open economy, Croatia relies heavily on internationalisation to build its entrepreneurial system. These characteristics make it the perfect case study for our research questions. The results of our research can point the way for policy makers in Croatia, as well as in other open advanced economies, to strengthen local entrepreneurial dynamics.

Another valuable contribution of our work to the entrepreneurship and economic geography literature is a modelling approach that brings together a set of factors that are individually recognised as relevant to firm entry, survival, and growth, but have never been addressed together in a single study framework. We examine the influence of entrepreneurial zones, infrastructure, remoteness, production subsidies, and knowledge intensity of the local economy. The paper is organised as follows. The next section provides the conceptual framework of the study. The empirical strategy is presented in section three. The results of the study are discussed in section four. Section five concludes.

1. **Conceptual framework**

The contribution of spatial proximity to entrepreneurial outcomes has occupied scholars for a long time. By its nature, entrepreneurship is a localized process that takes place in a community of interdependent agents (Leyden et al., 2014). The social context (e.g. institutions, resources and networks), the local dynamics of technological change and culture are well established providers of business opportunities (Audretsch and Feldman, 1996; Cuervo et al., 2007; Audretsch and Keilbach, 2007; Acs, 2008; Stam, 2015). These factors are strongest in the presence of cognitive, organizational, social, and institutional proximity found in narrow geographical distance (Audretsch and Lehmann, 2005; Malecki, 2009; Coomes et al., 2012; Malecki, 2018). Knowledge and technology spillovers that promote entrepreneurship, innovation and productivity growth (Henderson et al., 1995; Rosenthal and Strange, 2004; Van Oort, 2015) are also higher in areas such as cities or towns where agents share perceptions, interpretations, and evaluations of the external environment (Boschma, 2005).

In their seminal article Santarelli and Vivarelli (2007) have noted that the familiarity of local milieu provides deeper understanding of internal and external features of the business environment in which new firm will operate. The local economic structure, labour market dynamics, consumer base, industry density and specialization generate localised spillovers of non-tradable knowledge. The local variations in the endowment of this entrepreneurship capital determine the formation and growth of firms. Localised determinants of entrepreneurial outcomes have been found within and between different types of industries (Feldman and Audretsch, 1999; Audretsch et al., 2014; Van Oort, 2015; Andersson and Larsson, 2016) and firm entry has been associated with the presence of similar industries, opportunities for technology and knowledge spillovers, and location cost advantages (Glaeser and Kerr, 2009; Knoben et al., 2011).

Local spatial ties are also relevant for firm survival, especially in high-technology intensive industries (Trettin and Welter, 2011). Stronger, heterogeneous and larger networks reduce the costs of entrepreneurial search and uncertainty and promote innovation through information spillovers, peer behaviours, attitudes and perceptions, induction of motivation and entrepreneurial aspirations (Andersson and Larsson, 2016). Similarly, embeddedness in an institutional network provides firms with access to scarce resources (Dai and Liu, 2015). However, proximity may also hinder entrepreneurial efforts, as established firms may be reluctant to share knowledge with competitors (Ben Letaifa and Rabeau, 2013).

Another explanation for the relevance of spatial proximity is offered by the literature on multiplier effects of firm dynamics (Johnson and Parker, 1994; Johnson and Parker, 1996; Dejardin, 2004). While on the one hand demonstration effects of firm entries and closures have a multiplicative potential for subsequent firm entries and closures, the existence of negative effects of competition or creative destruction has also been suggested (Johnson and Parker, 1994). These effects develop over time as potential entrants evaluate the likelihood of success based on the experience of incumbent firms. The empirical literature has not found a relationship between lagged births or deaths and their current levels, but the presence of lagged effects through a variety of other factors such as local demand or wealth has been reported (Johnson and Parker, 1996). As Dejardin (2004) notes, the multiplier and competitive effects take place both within and between sectors. The underlying logic is that complementarity of products within and between sectors, as outlined by Hicks and Allen (1934), increases the attractiveness of an area to potential customers, facilitating entry, growth and survival.

The role of proximity in creating spillovers is also central to the knowledge spillover theory of entrepreneurship (Audretsch and Lehmann, 2005; Ghio et al., 2015). The incentive to create new firms may come from the undervaluation of new knowledge by incumbents. Such ideas, whose potential is not recognised, often spill over into the market through new ventures by talented individuals who are unable to pursue their ideas within existing organisations. Opportunities for such spillovers are stronger in areas with high intensity of knowledge investment and accumulation (Audretsch and Feldman, 1996; Acs et al., 2009; Audretsch and Aldridge, 2009). Bode (2004) notes that such spillover opportunities are highly localised and likely confined to adjacent geographic areas due to proximity mechanisms that are often found in a narrow geographical setting (Sautet, 2013).

While pointing to the positive effects of spatial proximity, the literature on localised determinants of entrepreneurship suffers from several shortcomings. Local and contextual determinants of entrepreneurship are predominantly analysed at the level of regions or metropolitan areas with flourishing entrepreneurial activity (Baumgartner et al., 2013). Remote, distant areas or those with low intensity of entrepreneurial activity, and local communities in less advanced countries have been largely neglected. Understanding local determinants of firm entry, survival and growth in such contexts is particularly relevant as these environments often lack essential resources for the success of their ventures. It is therefore relevant to investigate whether and in what way specialisation and diversification of economic activity contribute to the entry, survival and growth of firms in different types of local communities.

Another gap in the entrepreneurship literature relates to the role of trade-related externalities. With the globalisation of economic activity, trade and GVC linkages have gained importance as valuable sources of opportunities for firm entry and growth, but these channels have received limited attention in the existing literature (Stojcic et al., 2020). These opportunities arise through export specialisation and diversification, often referred to as intensive and extensive export margins. Export specialisation can be associated with more specialised knowledge and sophistication, offering more entry and growth opportunities. Diversification along multiple export lines makes locations more resilient to shocks (Kramarz et al., 2020) and leads to a more diverse knowledge base (Brunow et al., 2019). Inn this way it creates opportunities for market entry, growth and survival. Somewhat surprisingly, empirical studies have neglected the impact of export margins on entrepreneurial outcomes. Export linkages are relevant because they act as a source of knowledge and technology spillovers within their own industry and in downstream and upstream industries.

The relevance of export-related externalities can also be explained through the lens of the entrepreneurial multiplier and economic base literature (Dejardin, 2004). As mentioned earlier, the multiplier literature posits that the success of incumbent firms, for example in the international market, acts as a signal to new entrants and increases the chances of growth and survival. This can happen both within the incumbent firm's industry and in other complementary industries. In the context of the globalised economy, the source of multiplier effects may also be external demand, as predicted by economic base theory and, more narrowly, export base theory (Hoyt, 1949; Alexander, 1954). Satisfying external demand builds the base of the local economy and generates multiplier effects within the industry, but also in other activities related to exports or serving the internal needs of an economy.

*H1a: The specialization of the local economic structure through an intensive export margin facilitates the entry, survival and growth of businesses within cities and towns.*

*H1b: Diversifying the local economic structure through an extensive export margin facilitates the entry, survival, and growth of businesses within cities and towns.*

As noted earlier, entrepreneurship is primarily a local process whose determinants reside in local communities. However, economic geography long ago recognised that economic processes occur within and across geographic space. A stronger economic base and entrepreneurial activity in some cities and towns can also have a multiplier effect on neighbouring areas through effects such as worker mobility, demonstration effects, or upstream and downstream linkages between firms. In the modern, knowledge-intensive environment, these effects may extend beyond the immediate proximity between local communities due to advances in information and communication technologies. Similar to the local effects of export margins, spatial effects on entrepreneurial outcomes have not been addressed in the existing literature. It remains to be empirically investigated whether extensive and intensive export margins have effects on entrepreneurial outcomes at the local level of cities and towns, and whether these effects are spatially confined to a narrow geographic area or extend across space.

*H2a: The specialization of the local economic structure through an intensive export margin facilitates the entry, survival and growth of businesses between cities and towns.*

*H2b: Diversifying the local economic structure through an extensive export margin facilitates the entry, survival, and growth of businesses between cities and towns.*

Both intensive and extensive export margins can occur within individual sectors of the economy, but can also provide entry, survival, and growth opportunities for other sectors of the economy through cross-sector linkages. Many decades ago, the literature recognized a particularly strong potential for such cross-sectoral effects in manufacturing (Kuznets, 1957; Chenery, 1960, Kaldor, 1978). Subsequent studies have empirically confirmed these theoretical arguments (Dejardin, 2004; Szirmai, 2012), particularly in less developed and deindustrialized countries. Nevertheless, the existence of such effects on firm entry, survival and growth has not been the subject of previous research. This leads us to our third and final hypothesis:

*H3a: Intensive and extensive export margins within manufacturing facilitate the entry, survival and growth of businesses in other sectors within cities and towns.*

*H3b: Intensive and extensive export margins within manufacturing facilitate the entry, survival and growth of firms in other sectors between cities and towns.*

1. **Empirical strategy**

Our empirical strategy aims to investigate the spatial impact of exports on entrepreneurial dynamics in Croatia, the youngest and one of the least advanced EU member states from Central and Eastern Europe (CEE). The analysis covers the period 2007-2017, a decade in which Croatia became an EU member, but also a period in which it experienced one of the deepest recessions in Europe. Entrepreneurial activity in Croatia is weak and concentrated in a few geographical areas (Stojčić et al., 2018). Similar to many small and open economies, there are high hopes among policy makers that exports can provide the desired boost to entrepreneurship and revitalize the lagging parts of the country. Our findings can therefore serve as guidelines for policy makers of many countries in a similar situation.

The analysis is based on a unique dataset from FINA - a Croatian financial agency that has previously been used in studies of business dynamics (Stojcic et al., 2019; Coad and Srhoj, 2020). FINA is a public agency to which all firms are required to submit their annual financial reports along with a range of other information such as number of employees or industry. We are dealing with a firm population that includes 926,117 observations, of which 124,827 are from the manufacturing sector (Figure 1)[[1]](#footnote-1). For this analysis, the data were aggregated at the level of all 556 Croatian cities and towns. We are, thus, in a unique position to study the localised determinants of entrepreneurship dynamics across the entire territory and population of firms of a country.

Typically, entrepreneurial outcomes are defined as the proportion of the total population of firms in each location. However, such measures do not show the magnitude of processes relative to other geographic units and may assign excessive weight to locations with small firm populations, where even an incremental change in a single firm category leads to a large increase in the indicator value. For this reason, our strategy departs from this conventional approach. Specifically, we relate the number of individual firm categories in a given location to the total number of firms that fall into that category at the national level. In the case of firm entries, this effectively means that the variable is constructed as the proportion of entries in a given location to the total number of entries in a year and the same holds for other outcomes.

The justification for such an approach can be found in the research objective of our study. We have previously argued that entrepreneurship is a localised process and framed our research questions as those concerning the effects of local export margins and other local characteristics on entry, survival, and growth within and across cities and towns. In our view, asking whether a larger concentration of selected categories of firms (as a share of the total category) in one location leads to spatial effects in other areas is more appropriate than examining a larger share of such a category in the total population of firms. Previous studies have addressed the issue of entry, survival and growth measurement in the context of underlying variables (e.g. turnover or employment) and absolute or relative measures (Eurostat-OECD, 2007; Arrighetti and Lasagni, 2013; Coad et al., 2014), but to our knowledge the issue touched by our work has not been the subject of discussion, which can be considered as another novelty of our study.

Figure 1 about here

A visual inspection of firm entry, survival and growth rates (Figure 2) shows that most entrepreneurial activity takes place in metropolitan areas. This has to do with the territorial fragmentation of the country, which includes many local units characterised by low population density, very small or non-existent economic activity and a very small number of enterprises. Here, firm survival figures refer to the proportion of firms that survive in the period t+1 and t+3 since inception. High-growth firms are defined as firms that have achieved employment growth of at least 20% over a three-year period, while gazelles (young high-growth firms) include firms that are less than five years old and meet the above growth criteria in line with the Eurostat-OECD (2007) definition.

Figure 2 about here

The results of the global and local Moran tests for the spatial correlation of firm entry, survival, and growth are presented in the Appendix (Table A1.1). The accompanying LISA maps (Figures A1.1 - A1.5) also show the spatial distribution of entrepreneurial activity. Broadly speaking, there is evidence of spatial linkages between firms in all the years studied, and these linkages appear to be strongest in metropolitan areas and in the North West of the country, the area with the strongest industrial base. The predominant pattern of spatial correlation appears to be high, suggesting that local units with high rates of entry, survival, and growth are surrounded by local units that exhibit similar levels of entrepreneurial activity. In other areas, we also find a high-low pattern of spatial correlation, suggesting that units with high and low values of the observed variables are clustered with respect to each other.

One possible mechanism behind these results could be the intensity and structure of export activity in particular locations. As argued in our theoretical section, there are a variety of channels through which export performance can affect local outcomes, including learning through exporting, demand for inputs, demonstration effects, and more indirect channels, such as those realised through better sales by local export firms in the domestic market. One way to examine this issue is to relate the firm dynamics results discussed earlier to a measure of local export activity, such as the share of local exports in a country's total exports. However, such an approach reveals only the tip of the iceberg of export channels that influence the domestic economy. A far more informative approach is that which aims to answer which of the local export patterns shape domestic entrepreneurial outcomes.

To address this question, we turn to the macroeconomic and industrial literature and decompose local export performance into its extensive and intensive margins. This allows us to examine whether diversification (increasing the number of exported product categories by the local unit) or specialization (increasing exports of already exported products) are more relevant for local firm entry, survival, and growth. We closely follow the approach of Hummels and Klenow (2005), where exports of country *j* are evaluated relative to exports of the rest of the world, denoted *k*, to a given destination country. In our analysis, we compare the exports of city or municipality *j* to world *m* with the exports of all other local units *k* in our sample to the world. Following the logic above, the ratio of exports of city *j* to *m* versus exports of *k* to *m* can be expressed as follows:

(1)

Equation (1) thus presents exports of city *j* in period t to *m* over exports of *k* in I categories of products which can be further decomposed into extensive (width) and intensive (depth) export margin. Extensive margin takes form:

(2)

Nominator of extensive margin in (2) shows the number of product lines *i* exported by city *j* to world *m* in each period where each product line is multiplied with its value in exports of reference group *k*. Product lines *i* in nominator of (2) are subset of all product lines *I* exported by country under consideration. Denominator of the above expression contains number of all product lines exported by reference group *k* to destination *m* multiplied with their value in exports of *k* to *m*. Hummels and Klenow (2005) define extensive margin constructed this way as weighted count of *j*’s traded categories relative to *k’*s traded categories where value of category in exports of reference group is used as weight. Such construction of weight prevents appearance of category as important due to the fact that it is exported predominantly by city *j*. In case of all categories having same relevance in exports of *j* and *k,* EM presents the fraction of categories exported by *k* in which *j* exports to *m*.

(3)

The intensive margin of exports (3) can be defined as a ratio between exports of *j* and *k* in those categories *i* of *I* in which *j* exports to *m*. It shows the relevance of individual city in exports over exports of all other cities in the country within a given product or group of products in which it exports. The product of two margins equals the ratio in total exports between *j* and *k*.

One problem that must be considered is that of product aggregation levels. The existing literature claims that too high aggregation levels do not reveal a true picture even in country-level analyses, since at higher product aggregation levels the number of units exporting to all categories outweighs the number of those exporting to only some or all categories. Our dataset allows us to overcome this problem. Information on export earnings is available at a very detailed four-digit product level of NACE rev2 classification, which covers a total of 224 manufacturing product categories.

As before, global and local Moran tests for extensive and intensive margins were performed and the results are reported in the Appendix (Table A1.2). These tests show the presence of spatial correlation in extensive and partial intensive margin in areas that are also characterised by spatial correlation of entrepreneurship variables. This calls for an estimation technique capable of modelling spatial dependence in the dependent variable and in one or more independent variables. Therefore, we develop a model that in general terms is as follows:

= (4)

In model (4) the entrepreneurial outcome in city *i,*  depends on time-invariant location factors A0, intra and inter-city export patterns between local units *i* and *j*, and on the level of entrepreneurial outcomes of neighbouring units. The link between entrepreneurial outcomes in local units *i* and *j* is measured with an elasticity of while is the elasticity of linkages between export effects and *wij* is factor whose magnitude depends on the definition of spatial weights matrix. Use of spatial econometric models enables also a reduction of omitted variable bias (LeSage and Pace, 2009). The issue that is particularly relevant in the context of export margins. Their effects can be realised through a number of mechanisms whose modelling is impossible due to the lack of relevant data. In our model we assume that these omitted variables are subject to some degree of spatial correlation and endogenous to entrepreneurial outcomes. For this reason, Spatial Durbin model is applied as appropriate solution (Elhorst, 2014). Our baseline specification takes form of:

(4)

In model (4) the dependent variable is one of previously defined entrepreneurial outcomes in manufacturing sector. The expression is the interaction effect of the dependent variable with the dependent variables of other units and *wij*is the i,j-th element of a prespecified nonnegative NxN spatial weights matrix W. The impact of changes in outcomes of other units is measured with the spatial autoregressive coefficient () while *β* and *θ* are intra-locational and inter-locational elasticities of extensive and intensive margins.

In addition to the information from this source, we have also constructed some variables that are relevant for the purpose of this analysis. We control with the categorical variable metro for four main metropolitan regions in Croatia. As the largest cities and locations with diverse economic structures, developed entrepreneurial ecosystems, and relatively high demand, these locations have the potential to facilitate entry, survival, and growth. We also control for cities with no manufacturing firms in a given year and cities with more than one but fewer than 30 manufacturing firms.

Four variables enter the model to control for the presence of relevant infrastructure. A categorical variable controls for cities and towns with at least one entrepreneurial zone in a given year. Such zones provide firms with professional infrastructure, knowledge and technology spillovers, or other amenities relevant to their competitiveness. A categorical variable controls for access to the rail network in the local unit. Such a network allows for easier and faster transportation of goods and access to inputs. We also control for the presence of airports in the locality with a categorical variable and for road distance from the administrative centre of the county in kilometres with a continuous variable. Overall, better access to any of the above types of infrastructure and closer proximity to administrative centres is expected to allow firms to solve problems more easily, increase the potential for collaboration, and provide easier access to demand, all of which should increase firm entry, survival, and growth.

The structure of the local economy is controlled for with two continuous variables that measure the share of high technology intensive manufacturing and knowledge intensive services in the local economy. More sophisticated sectors require a specific combination of resources to compete, but also offer greater opportunities for differentiation and as such can trigger entry, survival and better opportunities for above average growth. A greater proportion of firms in such sectors may therefore increase our previously mentioned entrepreneurial outcomes. The model also includes the ratio between the average wage in the local unit and the average wage at the economy level. Higher wages may signal higher labour costs, thus discouraging new entrants and reducing the chances of survival and growth of firms in a high-cost-competitive market segment. Higher average wages may also be associated with better quality human capital and firms' efforts to attract skilled workers needed to compete in sophisticated market segments.

The ability to compete can significantly be improved with public incentives for building of indigenous competitiveness. Existence of public subsidies may attract new businesses but also make firms more competitive on the market and ease their survival and growth. We thus include share of public subsidies for production in local revenues of manufacturing sector as control variable.

During observed period Croatia, like most parts of the world, experienced severe economic crisis and it is possible that this process had impact on local entrepreneurial outcomes. It is also realistic to expect that these processes took place unequally across different parts of country. To control for such issues and following Elhorst (2014) we include in our estimation county and annual dummy variables .[[2]](#footnote-2) Finally, is disturbance term that is independent and identically distributed normal random variable. Estimation is undertaken with means of the Maximum Likelihood method where extensive and intensive margins of export are lagged one period due to expectation that the realization of changes along both margins requires time to be absorbed. Such practice is consistent with theoretical propositions from multiplier effects entrepreneurship literature. As noted there, present business dynamics arise as results of evaluations of chances for success in previous periods.

Our modelling technique allows us to control for spatial sources of endogeneity. However, inability to control for all potential determinants of analysed entrepreneurial outcomes makes our estimates potentially sensitive to non-spatial sources of endogeneity. Inclusion of lagged instead of contemporaneous versions of key variables partly alleviates this problem under, somewhat simplistic, assumption that economic agents are myopic. Such approach has been previously used in spatial econometrics analyses (Halpern and Murakozy, 2007; Stojcic and Orlic, 2020) as common econometric software packages do not accommodate alternative solutions. Additional estimations were performed with higher lags of export margins dating up to five years in the past in order to assess persistence of our findings. In almost all cases our findings remained robust. Tables A2.1 and A2.2 in the Appendix provide the definition and summary statistics of the variables.

Outcomes in spatial analysis depend, among other things, on construction of spatial weight matrices. We introduce inverse distance normalized matrix whose non-zero off-diagonal elements represent the degree of spatial interaction between all cities and municipalities while giving more weight to nearby territorial units. The elements of the spatial weight matrix are standardized so that the elements in each row add to one.

1. **Results of investigation**

Interpretations of results from econometric analyses are commonly based on reported estimation coefficients. However, such practice may lead to erroneous conclusions in spatial analyses (LeSage and Pace, 2009). Changes within a territorial unit generate two types of impact, a direct, within-area impact on itself and an indirect or across-site impact on other areas. Some of the latter generates the feedback effect to the place of origin through the spatial autoregressive term. For this reason, the results of spatial analyses should be interpreted in terms of direct and indirect effects calculated from the estimation results.

Standard model specification tests were performed in line with the procedure described by Belotti et al. (2017). We started with the SDM as the general specification and tested for the alternatives. In all specifications, the null hypothesis that the spatial lags of the lagged explanatory variables are equal to zero was rejected. Together with the statistically significant spatial lag of the dependent variable, this suggests that the spatial autoregressive model (SAR) should be rejected in favour of the SDM. The null hypothesis that θ = -βρ is also rejected allowing us also to reject spatial error model (SEM). Finally, the AIC and BIC criteria indicate that the SDM should be preferred to the model SAC. Next, we turn to the interpretation of our baseline model, which deals with manufacturing sector outcomes.

* 1. *Impact of export margins on entrepreneurial outcomes in manufacturing sector*

Our baseline model aims to examine the effects of extensive and intensive export margins on firm entry, survival, and growth in the manufacturing sector. Table 1 shows the average direct effects that take place within the cities and towns analysed. Across all analysed outcomes we find a positive and highly significant effect of the extensive margin. In the case of entry and survival, the effects suggest that a unit change in the extensive margin increases the share of entries in each location out of the total number of entries in the country by about 0.6 to 0.7 percent. The effects on the growth of all and young firms are somewhat higher, leading to effects on the share of high-growth firms of about 1 percent. The intensive margin appears to be relevant only in the case of t+1 survival and in the case of high growth firms. The magnitude is several times smaller than that observed for the extensive margin.

It seems that the diversification is primary export mechanism for strengthening of firm dynamics at the local level. The results on the control variables seem to confirm this story. Metropolitan regions, those with entrepreneurial zones and access to diverse transport infrastructure have higher shares of market entry, survival and growth. We also find evidence of a relationship between firm growth and distance from regional administrative centres, suggesting that access to greater demand and entrepreneurial infrastructure in these locations is beneficial for firm growth. A higher share of sophisticated manufacturing industries and a higher share of manufacturing firms in general facilitate entrepreneurial outcomes. Finally, the effect of manufacturing subsidies appears to be predominantly negative on entry and survival but positive on firm growth, a result that signals the targeting of such subsidies to existing firms in established product categories.

Table 1 about here

Table 2 shows indirect (spatial) effects on other cities and towns. Overall, we find positive effects on entry and early survival of firms in neighbouring areas through export diversification, but negative effects on both growth variables. These results suggest that new business opportunities attract new firms and provide them with better survival opportunities, but that at the same time diversification of other areas constrains growth in the neighbourhood by shortening supply routes of existing products or attracting the most skilled workers, etc. Among the control variables, we observe negative effects of metropolitan areas and access to diverse transportation infrastructure on entry and survival in neighbouring cities, but positive effects of such infrastructure on firm growth.

Table 2 about here

Higher share of high-tech manufacturing has a negative effect on entry and survival in neighbouring units, but the indirect effect on high-growth firms is positive. This suggests that a reorientation from the existing production structure to a more sophisticated structure is beneficial for strengthening entrepreneurial activity. We also find positive effects of higher wages and production subsidies in other areas on entry and survival, but negative ones on firm growth, a result consistent with the explanations for the results on the direct effects of these variables[[3]](#footnote-3).

* 1. *Effects on cities and municipalities with existing manufacturing sector*

Our results so far point to extensive export margin as principal channel of influence on local entrepreneurial outcomes in manufacturing. However, one must bear in mind the fact that large number of local units in our sample do not have any manufacturing firm or they include less than 10 manufacturing firms. Large number of zeros in our sample may drive results. As sensitivity analysis, we restricted our sample on localities with at least one manufacturing firm in any year in sample and re-estimated our regressions.

Table 3 about here

Tables 3 and 4 present results without 122 cities and municipalities in which no manufacturing firms existed. As it can be seen the sign and significance of coefficients remain the same and all model diagnostics continue to support chosen specification. The magnitude of coefficients is smaller than the one in baseline estimation in most of cases but overall our results do not seem to be driven with large number of units without manufacturing economic activity.

Table 4 about here

* 1. *Effects of export margins on entrepreneurial outcomes in other sectors.*

So far, we established how export margins affect entrepreneurial outcomes in manufacturing sector. However, importance of manufacturing for overall economic growth lies in its spillover effects on other sectors. To explore whether such effects are present we assess effects of extensive and intensive export margins in manufacturing sector on local firm entry, survival and growth in agriculture and mining, construction, retail and services. The latter is particularly interesting as it is mostly consisted of tourism activities, the sector that constitutes the considerable portion of Croatian economy. For expositional convenience we present here findings only for key variables of interest and leave out results on control variables.

Table 5 about here

Across sectors (Table 5), we find positive direct effects on entry and survival in agriculture and mining and retail and negative indirect effects in all sectors but retail from extensive margin. Negative sign of indirect effects signals the attraction of businesses from other areas towards local units with new exporting structure. Positive direct effects most likely signal sourcing of inputs from these sectors and ability of manufacturing firms to offer novel exported products to domestic market through downstream linkages with retailers. Indirect negative effects of extensive and intensive margin are observed in construction and services. It is thus likely that benefits for entry and survival are predominantly reserved for primary sector and retail firms in local economy while effects on other sectors in surrounding areas are mostly negative.

Local (direct) effects of extensive margin on growth are positive in primary sector and (in case of young high growing firms) in retail sector but negative in case of services. We also find weakly significant effect from intensive margin in primary sector. These findings signal that growth opportunities arise through supply of inputs from upstream sectors to both existing and newly diversified exporters within the local unit. Negative effects of extensive margin on growth of firms in local services are somewhat surprising at first but they may signal embeddedness of service companies in local manufacturing structure and thus their inability to satisfy the needs of new export structure.

Indirect effects on growth across all sectors are negative. In agriculture and retail they arise from extensive margin but in construction and services we also identify negative effect on growth of firms in other cities through intensive margin. It is thus likely that better performance and more intensive local manufacturing export attract resources from immediate surrounding and thus create growth opportunities for local economy. At the same time, this destroys linkages between local exporters of existing products and their partners in other areas thus eroding their opportunities for growth.

*4.4. The persistence of the export margins effects*

So far our findings provide support to the effects of the export margins on firm entry, survival and growth. To assess whether these effects are contemporaneous or they persist over time estimations of baseline specification were undertaken with higher lags of export margins up to five years in the past. In all cases (Tables 6 and 7) direct effects of export margins preserve their sign and significance. Higher lags of direct intensive margin effects turn significant in case of entry, survival and young high growth firms. This may be taken as evidence that specialization effects require time to build up and induce desired entrepreneurial outcomes. Results for indirect effects offer similar story.

Table 6 about here

Table 7 about here

Putting pieces of this section together, a reflection on research hypotheses should be made. Our results provide partial support to H1a (effects of export specialization) and full support to H1b (effects of export diversification) on firm entry survival and growth in manufacturing sector within cities and municipalities. There is limited support to H2b in case of firm entry and immediate survival (in t+1 period) between cities within manufacturing sector. These findings hold even when we exclude local units without manufacturing firms. Findings on H3 are only partially confirmed in agriculture and mining and in retail sector and for export diversification within local units. It is worth noting that in several cases we obtained statistically significant but negative effects both within and between cities and municipalities. This is particularly true in case of high growth firms. Such finding can be interpreted as sign that exporting activity of other areas constraints growth in immediate surrounding by cutting supply lines of existing products or attracting most skilled workers.

1. **Conclusion**

Firm dynamics are essential for the evolution of industries, locations and an entire economy. The role of exports in economy was commonly investigated at industry or country level. However, the mechanisms behind these aggregate channels occur at much lower levels of aggregation, among cities and municipalities. These interactions are particularly strong at small distances, and this pattern emphasizes the need to account for spatial dimension in modelling of relationships between trade and business dynamics. This paper extends the existing literature by assessing through which channels trade affect business dynamics within and between cities and municipalities while taking into account spatial dimension of these relationships. To the best of our knowledge, this issue has not been addressed in entrepreneurship literature before.

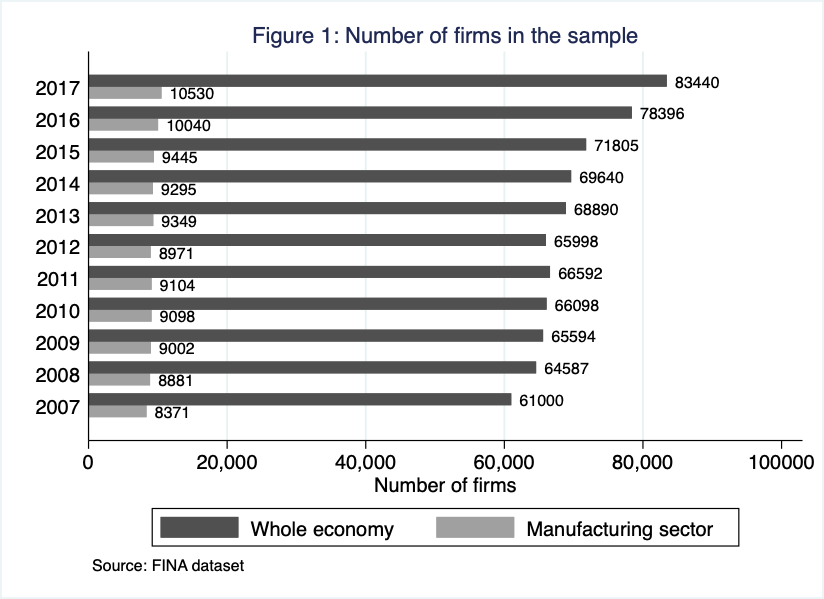
Overall, our findings suggest that through export diversification and changes in local production structure local policy makers can change entrepreneurial dynamics, attract new firms and ensure survival and growth of existing ones within manufacturing sector. This requires support through various types of public incentives such as subsidies whose effectiveness at present seems to be negative. For entrepreneurial outcomes to be higher a critical mass of businesses at given area is needed since our results show that these outcomes are higher in areas with higher number of manufacturing firms. Finally, our evidence points to strong positive effects of transport infrastructure and to some extent access to services found in regional administrative centres. These findings suggest that investment in other types of transport infrastructure than roads may increase intensity of entrepreneurial outcomes at local level.

The implications of our findings may serve to policy makers of all those emerging economies with uneven distribution of entrepreneurial activity. Future research should also control for the role of digital infrastructure and estimate effects on digitally intensive sectors, a research dimension that was not available within our dataset. Subject to future data availability, the robustness of our findings should be examined through analyses of local determinants of entrepreneurship in cross-country framework. Future studies should also pay attention to potential correlation between entrepreneurial outcomes analysed in this study. The sophistication of exports is another dimension whose relevance would be worth to examine in context of our investigation. It remains to be seen whether more sophisticated export structure is beneficial for entrepreneurship than standardised products that prevail in advancing economies. These ideas remain guidelines for future research.

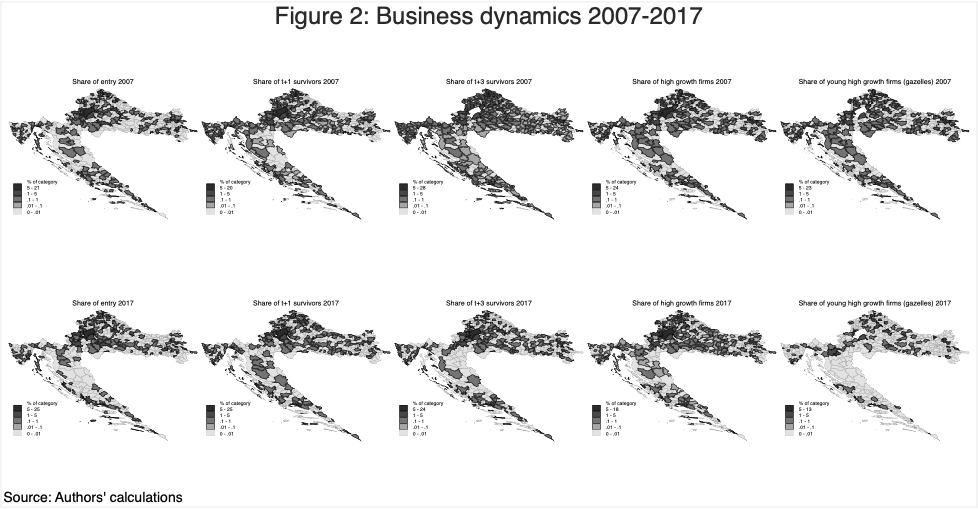
**REFERENCES:**

1. ﻿Audretsch, D. B., Keilbach, M. (2007), The localisation of entrepreneurship capital: Evidence from Germany, *Papers in Regional Science*, 86: 351-365
2. Acs, Z. J. (2008), Foundations of high impact entrepreneurship, *Foundations and Trends in Entrepreneurship*, 6: 535-620.
3. Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., Carlsson, B. (2009), The knowledge spillover theory of entrepreneurship, *Small business economics*, 32: 15-30.
4. Alexander, J. W. (1954), The basic-nonbasic concept of urban economic functions. *Economic Geography* 30: 246-261.
5. Andersson, M., Larsson, J. (2016), Local entrepreneurship clusters in cities, *Journal of Economic Geography*, 16: 39-66
6. Armington, C., Acs, Z. J. (2002). The determinants of regional variation in new firm formation, *Regional studies*, *36*: 33-45
7. Arrighetti, A., & Lasagni, A. (2013). Assessing the determinants of high-growth manufacturing firms in Italy. *International Journal of the Economics of Business*, 20(2), 245–267.
8. Audretsch, D. B., Aldridge, T. T. (2009), *Knowledge spillovers, entrepreneurship and regional development,* Handbook of regional growth and development theories, 201
9. Audretsch, D. B., Feldman, M. P. (1996), R&D spillovers and the geography of innovation and production, *The American economic review*, 86: 630-640
10. Audretsch, D., Falck, O., Feldman, M., Heblich, S. (2014), Local entrepreneurship in context, *Regional Studies*, 46: 379-389
11. Audretsch, D., Lehmann, E. (2005), Does the knowledge spillover theory of entrepreneurship hold for regions?, *Research Policy*, 34: 1191–1202
12. Baumgartner, D., Putz, M., Seidl, I. (2013), ﻿What Kind of Entrepreneurship Drives Regional Development in European Non-core Regions? A Literature Review on Empirical Entrepreneurship Research, *European Planning Studies.* 21: 1095-1127
13. Beaudry, C., Schiffauerova, A. (2009), Who's right, Marshall or Jacobs? The localization versus urbanization debate, *Research policy*, 38: 318-337
14. Belotti, F., Hughes, G. and Mortari, A. P. (2017). Spatial panel-data models using Stata. *The Stata Journal*, 17(1): 139-180.
15. Ben Letaifa, S., Rabeau, Y. (2013), ﻿Too close to collaborate? How geographic proximity could impede entrepreneurship and innovation, *Journal of Business Research*, 66: 2071-2078
16. Bode, E. (2004), The spatial pattern of localized R&D spillovers: an empirical investigation for Germany, *Journal of Economic Geography*, 4: 43-64
17. Boschma, R. (2005), Role of proximity in interaction and performance: Conceptual and empirical challenges, 41-45.
18. Brunow, S., Pestel, L., Partridge, M. (2019), Exports of firms and diversity: an empirical assessment for Germany, *Empirica*, 46: 151-175 ﻿
19. Chenery, H. B. (1960). Patterns of industrial growth. The American Economic Review, 50(4), 624–654.
20. Coad, A., Daunfeldt, S. O., Hölzl, W., Johansson, D., Nightingale, P. (2014). High-growth firms: introduction to the special section. *Industrial and Corporate Change*: 23(1), 91–112
21. Coad, A., Srhoj, S. (2020), Catching Gazelles with a Lasso: Big data techniques for the prediction of high-growth firms, *Small Business Economics, 55:* 541-565.
22. Coomes, P. A., Fernandez, J., Gohmann, S. F. (2013), The rate of proprietorship among metropolitan areas: the impact of the local economic environment and capital resources, *Entrepreneurship theory and practice*, *37*: 745-770
23. Cuervo, Á., Ribeiro, D., Roig, S. (2007), Entrepreneurship: concepts, theory and perspective. Introduction in Entrepreneurship (pp. 1-20). Springer, Berlin, Heidelberg.
24. Dai, W., Liu, Y. (2015), Local vs. non-local institutional embeddedness, corporate entrepreneurship, and firm performance in a transitional economy, *Asian Journal of Technology Innovation*, 23: 255-270
25. Dejardin, M. (2004). Sectoral and cross-sectoral effects of retailing firm demographies. *The Annals of Regional Science*, *38*(2), 311-334.
26. Elhorst, J. P. (2014), Spatial panel data models. In *Spatial econometrics* (pp. 37-93), Springer, Berlin, Heidelberg
27. Eurostat-OECD (2007). Manual on business demography statistics, European Commission. ISBN 978–92–79-04276-8.
28. Feldman, M., Audretsch, D. (1999), Innovation in cities: Science-based diversity, specialization and localized competition, *European Economic Review*, 43: 409-429
29. Fotopoulos, G., Spence, N. (1999), Spatial variations in new manufacturing plant openings: Some empirical evidence from Greece, *Regional Studies*, *33*: 219-229
30. Ghio, N., Guerini, M., Lehmann, E., Rossi-Lamastra, C. (2015), The emergence of the knowledge spillover theory of entrepreneurship, *Small Business Economics*, 44: 1-18
31. Glaeser, E., Kerr, W. (2009), Local industrial conditions and entrepreneurship: How much of the spatial distribution can we explain?, *Journal of Economics and Management Strategy*, 18: 623-663
32. Halpern, L., Muraközy, B. (2007), Does distance matter in spillover?, *Economics of Transition*, *15*: 781-805
33. Helpman, E., Melitz, M., Rubinstein, Y. (2008), Estimating Trade Flows: Trading Partners and Trading Volumes, *Quarterly Journal of Economics*, 123: 441-487
34. Henderson, V., Kuncoro, A., Turner, M. (1995), Industrial development in cities, *Journal of political economy*, 103: 1067-1090
35. Hoyt, H. (1949), The economic base of the Brockton. Massachusetts Area, Brockton, Mass.
36. Hummels, D., Klenow, P.L. (2005), The Variety and Quality of a Nation’s Exports, *American Economic Review*, 95: 704–723
37. Johnson, P., Parker, S. (1994). The interrelationships between births and deaths. *Small Business Economics*, *6*(4), 283-290.
38. Johnson, P., Parker, S. (1996). Spatial variations in the determinants and effects of firm births and deaths. *Regional Studies*, *30*(7), 679-688.
39. Kaldor, N. (1978). Further essays on economic theory. London: Duckworth.
40. Knoben, J., Ponds, R., Oort, F. (2011), ﻿Employment from new firm formation in the Netherlands: Agglomeration economies and the Knowledge Spillover Theory of Entrepreneurship, Entrepreneurship & Regional Development, 23: 35-157
41. Kramarz, F., Martin, J., Mejean, I. (2019), Volatility in the small and in the large: The lack of diversification in international trade, *Journal of International Economics*, 103276
42. Kuznets, S. (1957). Quantitative aspects of the economic growth of nations: II. Industrial distribution of national product and labor force. *Economic Development and Cultural Change*, 5(4), 1–111.
43. LeSage, J., Pace, R. K. (2009), Introduction to spatial econometrics. Chapman and Hall/CRC
44. Leyden, D.P., Link, A.N., Siegel, D.S. (2014), A theoretical analysis of the role of social networks in entrepreneurship, *Research Policy*, 43: 1157-1163
45. Malecki, E. (2009) Geographical environments for entrepreneurship, *International Journal of Entrepreneurship and Small Business*, 7: 175-190
46. Malecki, E. (2018), Entrepreneurship and entrepreneurial ecosystems, *Geography Compass,*12: 1-21
47. Melitz, M. J. (2003), The impact of trade on intra‐industry reallocations and aggregate industry productivity, *Econometrica*, 71: 1695-1725
48. Rosenthal, S. S., Strange, W. C. (2004), Evidence on the nature and sources of agglomeration economies, Handbook of regional and urban economics (Vol. 4, pp. 2119-2171). Elsevier.
49. Santarelli, E. and Vivarelli, M. (2007). Entrepreneurship and the process of firm entry, survival and growth. *Industrial and Corporate Change,* 16(3): 455-488.
50. Shane, S. (2009). Why encouraging more people to become entrepreneurs is bad public policy. *Small Business Economics,* 33: 141-149.
51. Sautet, F. (2013), Local and systemic entrepreneurship: Solving the puzzle of entrepreneurship and economic development, *Entrepreneurship Theory and Practice*, 37: 387-402
52. Stam, E. (2015), Entrepreneurial ecosystems and regional policy: a sympathetic critique, *European Planning Studies*, 23: 1759-1769
53. Stojčić, N. and Aralica, Z. (2018), (De)industrialization and lessons for industrial policy in Central and Eastern Europe, *Post-Communist Economies,* 30: 713-734
54. Stojčić, N., Anić, I.-D. and Aralica, Z. (2019), Do firms in clusters perform better? Lessons from wood- processing industries in new EU member states, *Forest Policy and Economics, 109:* 102043
55. Stojčić, N., Orlić, E. (2020), Spatial dependence, foreign investment and productivity spillovers in new EU member states, *Regional Studies*, 54: 1057-1068
56. Stojčić, N., Anić, I-D. and Svilokos, T. (2020), The Entrepreneurial Gains from Market Integration in the New EU Member States, *Small Business Economics, Online first,* 1-20
57. Szirmai, A. (2012), Industrialisation as an engine of growth in developing countries, 1950–2005, *Structural Change and Economic Dynamics,* 23: 406-420
58. Trettin, L., Welter, F. (2011), ﻿Challenges for spatially oriented entrepreneurship research, *Entrepreneurship & Regional Development: An International Journal*, 23: 575-602
59. Van Oort, F. (2015), Unity in variety? Agglomeration economics beyond the specialization-diversity controversy. Handbook of research methods and applications in economic geography, 259-271
60. Wagner, J. (2013), Exports, imports and firm survival: First evidence for manufacturing enterprises in Germany, *Review of World Economics*, 149: 113-130

**Figure 1:** Number of firms in the sample



**Figure 2**: Business dynamics 2007-2017



**Table 1**: Average direct effects on entrepreneurial outcomes

in manufacturing sector 2007-2017

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specification | Entry | t+1 survival | t+3 survival | High growth firms | High growth young firms |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive - direct | 0.56\*\*\*  (0.107) | 0.72\*\*\*  (0.097) | 0.61\*\*\*  (0.101) | 0.92\*\*\*  (0.089) | 1.16\*\*\*  (0.179) |
| Intensive – direct | 0.03  (0.039) | 0.09\*\*  (0.036) | 0.04  (0.038) | 0.11\*\*\*  (0.033) | 0.07  (0.067) |
| LOCAL CHARACTERISTICS |  |  |  |  |  |
| Metropolitan area – direct | 0.88\*\*\*  (0.091) | 0.47\*\*\*  (0.079) | 0.62\*\*\*  (0.078) | -0.18\*  (0.098) | 0.16  (0.151) |
| Entrepreneurial zone - direct | -0.01  (0.013) | 0.02\*  (0.011) | 0.02\*  (0.011) | 0.02\*  (0.011) | 0.04\*\*  (0.022) |
| Railway infrastructure - direct | 0.05\*\*\*  (0.009) | 0.04\*\*\*  (0.008) | 0.03\*\*\*  (0.007) | 0.03\*\*\*  (0.010) | 0.04\*\*\*  (0.015) |
| Airport – direct | 0.24\*\*\*  (0.060) | 0.17\*\*\*  (0.052) | 0.38\*\*\*  (0.050) | -0.19\*\*\*  (0.066) | 0.34\*\*\*  (0.099) |
| Distance from adm. centre - direct | -0.0002  (0.0002) | -0.0001  (0.0002) | -0.0003\*\*\*  (0.0001) | -0.001\*\*\*  (0.0002) | -0.001\*\*\*  (0.0003) |
| Share of high tech manufacturing firms – direct | 0.11\*\*\*  (0.027) | 0.16\*\*\*  (0.025) | 0.65\*\*\*  (0.026) | 0.99\*\*\*  (0.024) | 1.18\*\*\*  (0.048) |
| Share of knowledge intensive services - direct | 0.38\*\*\*  (0.031) | 0.40\*\*\*  (0.029) | -0.10\*\*\*  (0.031) | -0..39\*\*\*  (0.027) | -0.76\*\*\*  (0.054) |
| Share of production subsidies – direct | -0.06\*\*\*  (0.007) | -0.01\*  (0.007) | -0.03\*\*\*  (0.007) | 0.04\*\*\*  (0.006) | -0.02  (0.012) |
| Average wage – direct | -0.0001  (0.0001) | -0.0002\*\*  (0.0001) | -0.0001  (0.0001) | 0.0001  (0.0001) | -0.00004  (0.0002) |
| City with 0 manufacturing firms – direct | -0.46\*\*\*  (0.025) | -0.35\*\*\*  (0.022) | -0.29\*\*\*  (0.023) | -0.13\*\*\*  (0.024) | -0.15\*\*\*  (0.043) |
| City with 1-30 manufacturing firms – direct | -0.42\*\*\*  (0.023) | -0.31\*\*\*  (0.020) | -0.25\*\*\*  (0.020) | -0.11\*\*\*  (0.022) | -0.13\*\*\*  (0.040) |
| TIME AND COUNTY DUMMIES | Yes | Yes | Yes | Yes | Yes |
| Constant term | Yes | Yes | Yes | Yes | Yes |
| Number of local units | 556 | 556 | 556 | 556 | 556 |
| Number of observations | 6116 | 6116 | 6116 | 6116 | 6116 |
| Pseudo R2 | 0.97 | 0.97 | 0.97 | 0.97 | 0.86 |
| Wald test Ho: (wX’s=0) | 31.29\*\*\* | 33.35\*\*\* | 26.74\*\*\* | 75.82\*\*\* | 78.84\*\*\* |
| Wald test Ho: (θ = -βρ) | 22.80\*\*\* | 10.94\*\* | 22.59\*\*\* | 7.92\*\* | 26.63\*\*\* |

*Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level of significance respectively. Standard errors in brackets*

*Source: Authors’ calculations*

**Table 2**: Average indirect effects on entrepreneurial outcomes

in manufacturing sector 2007-2017

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specification | Entry | t+1 survival | t+3 survival | High growth firms | High growth young firms |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – indirect | 0.43\*\*\*  (0.134) | 0.20\*  (0.123) | -0.18  (0.129) | -0.68\*\*\*  (0.082) | -1.10\*\*\*  (0.235) |
| Intensive – indirect | 0.13  (0.088) | -0.11  (0.083) | 0.04  (0.091) | -0.11  (0.082) | -0.22  (0.172) |
| LOCAL CHARACTERISTICS |  |  |  |  |  |
| Metropolitan area - indirect | -0.04\*\*\*  (0.008) | -0.01\*\*\*  (0.004) | -0.0004  (0.005) | -0.005  (0.003) | 0.01  (0.010) |
| Entrepreneurial zone - indirect | 0.0003  (0.0005) | -0.001  (0.0003) | -0.00002  (0.0002) | 0.001  (0.004) | 0.003\*  (0.002) |
| Railway infrastructure – indirect | -0.002\*\*\*  (0.0001) | -0.001\*\*\*  (0.0003) | -0.00002  (0.0002) | 0.001\*  (0.0004) | 0.003\*\*  (0.001) |
| Airport – indirect | -0.01\*\*\*  (0.003) | -0.004\*\*  (0.002) | -0.00003  (0.003) | -0.005\*\*  (0.002) | 0.024\*\*\*  (0.009) |
| Distance from adm. centre - indirect | 0.00001  (0.00001) | 0.0000  (0.00000) | 0.0000  (0.0000) | -0.00001\*  (0.00001) | -0.0001\*\*  (0.00002) |
| Share of high tech manufacturing firms – indirect | -0.004\*\*\*  (0.001) | -0.004\*\*\*  (0.001) | -0.0005  (0.005) | 0.03\*\*\*  (0.009) | 0.08\*\*\*  (0.017) |
| Share of knowledge intensive services - indirect | -0.02\*\*\*  (0.003) | -0.01\*\*\*  (0.003) | 0.00001  (0.0008) | -0.01\*\*\*  (0.004) | -0.05\*\*\*  (0.012) |
| Share of production subsidies – indirect | 0.002\*\*\*  (0.0005) | 0.0003  (0.0002) | 0.00002  (0.0003) | 0.001\*\*\*  (0.0004) | -0.001  (0.001) |
| Average wage - indirect | 0.0005\*\*  (0.0002) | 0.001\*\*\*  (0.0002) | 0.00002  (0.0002) | -0.0002  (0.0002) | -0.001\*\*  (0.0004) |
| City with 0 manufacturing firms – indirect | 0.02\*\*\*  (0.004) | 0.01\*\*\*  (0.003) | 0.0002  (0.002) | -0.003\*\*  (0.001) | -0.01\*\*\*  (0.004) |
| City with 1-30 manufacturing firms indirect | 0.02\*\*\*  (0.004) | 0.01\*\*\*  (0.002) | 0.0002  (0.002) | -0.003\*\*  (0.001) | -0.01\*\*\*  (0.004) |

*Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level of significance respectively. Standard errors in brackets*

*Source: Authors’ calculations*

**Table 3:** Average direct effects on entrepreneurial outcomes

in manufacturing sector 2007-2017 (local units with manufacturing firms)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specification | Entry | t+1 survival | t+3 survival | High growth firms | High growth young firms |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive - direct | 0.51\*\*\*  (0.119) | 0.79\*\*\*  (0.107) | 0.46\*\*\*  (0.112) | 0.92\*\*\*  (0.100) | 0.90\*\*\* |
| Intensive – direct | 0.02  (0.047) | 0.08\*  (0.043) | 0.02  (0.046) | 0.11\*\*\*  (0.041) | 0.03  (0.082) |
| LOCAL CHARACTERISTICS |  |  |  |  |  |
| Metropolitan area – direct | 1.00\*\*\*  (0.087) | 0.76\*\*\*  (0.076) | 0.50\*\*\*  (0.069) | -0.20\*\*  (0.096) | -0.30\*\*  (0.142) |
| Entrepreneurial zone - direct | -0.005  (0.015) | 0.02  (0.013) | 0.02  (0.013) | 0.02  (0.013) | 0.04\*  (0.025) |
| Railway infrastructure - direct | 0.06\*\*\*  (0.011) | 0.04\*\*\*  (0.009) | 0.03\*\*\*  (0.008) | 0.03\*\*\*  (0.012) | 0.05\*\*\*  (0.017) |
| Airport – direct | 0.28\*\*\*  (0.062) | 0.30\*\*\*  (0.053) | 0.31\*\*\*  (0.049) | -0.22\*\*\*  (0.068) | 0.07  (0.101) |
| Distance from adm. centre - direct | -0.0002  (0.0002) | -0.0002  (0.0002) | -0.0001  (0.0002) | -0.0005\*\*  (0.0002) | -0.0001\*  (0.0003) |
| Share of high tech manufacturing firms – direct | 0.11\*\*\*  (0.030) | 0.17\*\*\*  (0.029) | 0.65\*\*\*  (0.029) | 0.99\*\*\*  (0.027) | 1.17\*\*\*  (0.056) |
| Share of knowledge intensive services - direct | 0.34\*\*\*  (0.022) | 0.27\*\*\*  (0.021) | -0.03  (0.021) | -0.39\*\*\*  (0.020) | -0.52\*\*\*  (0.039) |
| Share of production subsidies – direct | -0.06\*\*\*  (0.008) | -0.01\*  (0.007) | -0.03\*\*\*  (0.008) | 0.04\*\*\*  (0.006) | -0.007  (0.014) |
| Average wage – direct | -0.0001  (0.0002) | -0.0001  (0.0002) | -0.0001  (0.0002) | 0.0001  (0.0002) | -0.0001  (0.0003) |
| City with 1-30 manufacturing firms – direct | -0.43\*\*\*  (0.024) | -0.36\*\*\*  (0.022) | -0.24\*\*\*  (0.022) | -0.10\*\*\*  (0.023) | -0.04  (0.042) |
| TIME AND COUNTY DUMMIES | Yes | Yes | Yes | Yes | Yes |
| Constant term | Yes | Yes | Yes | Yes | Yes |
| Number of local units | 434 | 434 | 434 | 434 | 434 |
| Number of observations | 4774 | 4774 | 4774 | 4774 | 4774 |
| Pseudo R2 | 0.97 | 0.97 | 0.97 | 0.97 | 0.86 |
| Wald test Ho: (wX’s=0) | 22.86\*\*\* | 19.97\*\*\* | 23.43\*\*\* | 71.07\*\*\* | 85.41\*\*\* |
| Wald test Ho: (θ = -βρ) | 19.44\*\*\* | 6.72\* | 19.03\*\*\* | 12.48\*\*\* | 25.91\*\*\* |

*Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level of significance respectively. Standard errors in brackets*

*Source: Authors’ calculations*

**Table 4**: Average indirect effects on entrepreneurial outcomes

in manufacturing sector 2007-2017 (local units with manufacturing firms only)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specification | Entry | t+1 survival | t+3 survival | High growth firms | High growth young firms |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – indirect | 0.42\*\*\*  (0.133) | 0.18  (0.095) | -0.26\*\*  (0.125) | -0.70\*\*\*  (0.125) | -1.22\*\*\*  (0.222) |
| Intensive – indirect | 0.16  (0.101) | -0.06  (0.095) | -0.04  (0.102) | -0.27\*\*\*  (0.095) | -0.41\*\*\*  (0.014) |
| LOCAL CHARACTERISTICS |  |  |  |  |  |
| Metropolitan area - indirect | -0.04\*\*\*  (0.009) | -0.01\*\*  (0.006) | 0.001  (0.004) | -0.006\*  (0.003) | -0.02\*  (0.010) |
| Entrepreneurial zone - indirect | 0.0002  (0.0005) | -0.0004  (0.0003) | 0.00004  (0.0001) | 0.001  (0.0004) | 0.003  (0.002) |
| Railway infrastructure – indirect | -0.002\*\*\*  (0.001) | -0.001\*\*  (0.0004) | 0.0001  (0.0002) | 0.001\*\*  (0.0004) | 0.003\*\*  (0.001) |
| Airport – indirect | -0.01\*\*\*  (0.003) | -0.006\*\*  (0.002) | 0.001  (0.002) | -0.01\*\*  (0.003) | 0.005  (0.007) |
| Distance from adm. centre - indirect | 0.00001  (0.00001) | 0.0000  (0.0000) | 0.0000  (0.0000) | -0.00001\*  (0.00001) | -0.00001\*  (0.00001) |
| Share of high tech manufacturing firms – indirect | -0.004\*\*\*  (0.001) | -0.003\*\*  (0.001) | 0.001  (0.004) | 0.03\*\*\*  (0.009) | 0.08\*\*\*  (0.017) |
| Share of knowledge intensive services - indirect | -0.01\*\*\*  (0.003) | -0.005\*\*  (0.002) | -0.0001  (.0002) | -0.01\*\*\*  (0.003) | -0.04\*\*\*  (0.008) |
| Share of production subsidies – indirect | 0.002\*\*\*  (0.001) | 0.0003  (0.0002) | -0.0001  (0.0002) | 0.001\*\*\*  (0.0004) | -0.001  (0.001) |
| Average wage - indirect | 0.0002  (0.0003) | 0.0001\*\*\*  (0.0003) | 0.0001  (0.0003) | -0.0002  (0.0003) | -0.001\*\*  (0.0001) |
| City with 1-30 manufacturing firms indirect | 0.02\*\*\*  (0.004) | 0.01\*\*  (0.003) | -0.0005  (0.002) | -0.003\*\*\*  (0.001) | -0.003  (0.003) |

*Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level of significance respectively. Standard errors in brackets*

*Source: Authors’ calculations*

**Table 5**: Average direct and indirect effects of export margins on entrepreneurial outcomes in other sectors 2007-2017

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Entry | t+1 survival | t+3 survival | High growth firms | High growth young firms |
| Direct effects | | | | | |
| Agriculture & mining - extensive | 1.08\*\*\*  (0.223) | 0.45\*\*  (0.211) | 0.88\*\*\*  (0.222) | 1.26\*\*\*  (0.229) | 0.98\*\*  (0.467) |
| Agriculture & mining – intensive | 0.06  (0.084) | 0.05  (0.080) | 0.13  (0.084) | 0.15\*  (0.086) | 0.29\*  (0.176) |
| Construction – extensive | -0.63\*\*\*  (0.114) | -0.10  (0.108) | 0.02  (0.137) | 0.02  (0.120) | 0.24  (0.200) |
| Construction – intensive | -0.01  (0.043) | -0.02  (0.040) | 0.04  (0.048) | 0.01  (0.045) | 0.07  (0.076) |
| Retail – extensive | 0.45\*\*\*  (0.083) | 0.45\*\*\*  (0.084) | 0.58\*\*\*  (0.095) | 0.06  (0.078) | 0.86\*\*\*  (0.183) |
| Retail – intensive | 0.02  (0.031) | 0.04  (0.031) | 0.06  (0.035) | -0.002  (0.029) | 0.0004  (0.069) |
| Services – extensive | -0.06  (0.073) | -0.05  (0.067) | 0.04  (0.080) | -0.27\*\*\*  (0.095) | -0.19  (0.139) |
| Services – intensive | -0.04  (0.027 | -0.01  (0.024) | 0.02  (0.030) | -0.04  (0.035) | -0.002  (0.052) |
| Indirect effects | | | | | |
| Agriculture & mining – extensive | -0.71\*\*\*  (0.267) | -0.26  (0.250) | 0.18  (0.253) | -0.56\*  (0.306) | -0.14  (0.536) |
| Agriculture & mining – intensive | -0.15  (0.209) | -0.03  (0.195) | -0.23  (0.202) | -0.25  (0.214) | -0.04  (0.417) |
| Construction – extensive | -0.81\*\*\*  (0.161) | -0.01\*\*  (0.005) | -0.91\*\*\*  (0.181) | -1.24\*\*\*  (0.182) | -1.47\*\*\*  (0.268) |
| Construction – intensive | -0.16  (0.105) | -0.22\*\*  (0.099) | -0.08  (0.118) | -0.21\*\*  (0.112) | -0.32\*  (0.188) |
| Retail – extensive | 0.25\*\*  (0.118) | -0.05  (0.118) | 0.50\*\*\*  (0.130) | -0.09  (0.119) | 1.52\*\*\*  (0.238) |
| Retail - intensive | -0.05  (0.075) | -0.07  (0.076) | 0.11  (0.085) | -0.01  (0.072) | 0.12  (0.161) |
| Services – extensive | -0.78\*\*\*  (0.108) | -1.06\*\*\*  (0.010) | -0.53\*\*\*  (0.116) | -1.56\*\*\*  (0.147) | -1.23\*\*\*  (0.196) |
| Services - intensive | -0.12\*  (0.067) | -0.19\*\*\*  (0.060) | 0.03  (0.072) | -0.21\*\*  (0.088) | -0.17  (0.126) |

*Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level of significance respectively. Standard errors in brackets*

*Source: Authors’ calculations*

**Table 6**: Average direct effects on entrepreneurial outcomes

in manufacturing sector 2007-2017 with different lags of export margins

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specification | Entry t+1 | Entry t+2 | Entry t+3 | Entry t+4 | Entry t+5 |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – direct | 0.55\*\*\*  (0.106) | 0.56\*\*\*  (0.114) | 0.83\*\*\*  (0.123) | 0.69\*\*\*  (0.135) | 1.02\*\*\*  (0.146) |
| Intensive – direct | 0.05  (0.039) | 0.04  (0.039) | 0.11\*\*\*  (0.041) | 0.14\*\*\*  (0.044) | 0.11\*\*  (0.046) |
| Specification | t+1 survival | t+2 survival | t+3 survival | t+4 survival | t+5 survival |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – direct | 0.70\*\*\*  (0.095) | 0.57\*\*\*  (0.103) | 0.58\*\*\*  (0.101) | 0.79\*\*\*  (0.121) | 0.82\*\*\*  (0.132) |
| Intensive – direct | 0.09\*\*  (0.036) | 0.04  (0.036) | 0.06  (0.038) | 0.10\*\*  (0.040) | 0.14\*\*\*  (0.042) |
| Specification | HGR t+1 | HGR t+2 | HGR t+3 | HGR t+4 | HGR t+5 |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – direct | 0.91\*\*\*  (0.089) | 0.81\*\*\*  (0.097) | 0.63\*\*\*  (0.105) | 0.82\*\*\*  (0.107) | 0.56\*\*\*  (0.115) |
| Intensive – direct | 0.12\*\*\*  (0.033) | 0.05  (0.034) | 0.01  (0.036) | 0.04  (0.035) | 0.03  (0.035) |
| Specification | Young HGR t+1 | Young HGR t+2 | Young HGR t+3 | Young HGR t+4 | Young HGR t+5 |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – direct | 1.13\*\*\*  (0.179) | 1.27\*\*\*  (0.196) | 1.31\*\*\*  (0.216) | 1.49\*\*\*  (0.235) | 1.14\*\*\*  (0.269) |
| Intensive – direct | 0.09  (0.067) | 0.13\*  (0.070) | 0.15\*\*  (0.074) | 0.17\*\*  (0.078) | 0.10  (0.084) |

**Table 7**: Average indirect effects on entrepreneurial outcomes

in manufacturing sector 2007-2017 with different lags of export margins

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Specification | Entry t+1 | Entry t+2 | Entry t+3 | Entry t+4 | Entry t+5 |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – indirect | 0.43\*\*\*  (0.134) | 0.65\*\*\*  (0.146) | 0.67\*\*\*  (0.160) | 0.43\*\*  (0.179) | 1.29\*\*\*  (0.234) |
| Intensive – indirect | 0.13  (0.088) | 0.06  (0.147) | 0.13  (0.095) | 0.15  (0.103) | 0.26\*\*  (0.121) |
| Specification | t+1 survival | t+2 survival | t+3 survival | t+4 survival | t+5 survival |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – indirect | 0.20\*  (0.123) | 0.28\*\*  (0.134) | -0.18  (0.129) | 0.22  (0.163) | -0.06  (0.181) |
| Intensive – indirect | -0.11  (0.083) | 0.02  (0.081) | 0.04  (0.091) | 0.09  (0.096) | 0.14  (0.103) |
| Specification | HGR t+1 | HGR t+2 | HGR t+3 | HGR t+4 | HGR t+5 |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – indirect | -0.68\*\*\*  (0.082) | -0.71\*\*\*  (0.140) | -0.58\*\*\*  (0.152) | -0.25  (0.165) | 0.09  (0.181) |
| Intensive – indirect | -0.11  (0.082) | 0.02  (0.085) | -0.04  (0.087) | 0.17\*  (0.087) | 0.19\*\*  (0.086) |
| Specification | Young HGR t+1 | Young HGR t+2 | Young HGR t+3 | Young HGR t+4 | Young HGR t+5 |
| EXPORT MARGINS |  |  |  |  |  |
| Extensive – indirect | -1.10\*\*\*  (0.233) | -1.06\*\*\*  (0.252) | -1.00\*\*\*  (0.273) | -0.67\*\*  (0.309) | -0.81\*\*  (0.368) |
| Intensive – indirect | -0.22  (0.172) | 0.08  (0.178) | 0.09  (0.186) | -0.11  (0.196) | -0.19  (0.218) |

1. We have access to data covering 2004-2007 period. First three years had to be excluded from analysis through construction of several dependent variables as it will be shown later in the paper. [↑](#footnote-ref-1)
2. Estimations were undertaken also for subperiods from 2007-2013 and from 2014-2017 to assess sensitivity of model on economic crises. Key variables and most other results retain their signs and significance but the magnitude of coefficients changes to some extent. Printouts available on request. [↑](#footnote-ref-2)
3. Sensitivity of model to inclusion of additional control variables was performed with inclusion of Herfindahl Hirschman index of market concentration. Results in Tables A3.1 and A3.2 of Online appendix reveal that all results retain their signs and significance while the magnitude of coefficients changes only marginally. [↑](#footnote-ref-3)