# Spatial and sectoral features of the firm demography in Italy

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**Abstract.** This paper aims at investigating some spatial and sectoral features of the firm demography in Italian NUTS-3 regions, over the period 2004-2009. To this end, we use a recent version of the spatial shift-share decomposition which, beyond traditionally looking at national, industrial mix and regional-shift components, allows to analyse the neighbourhood influence reducing the risk of misinterpretation which is a drawback of past versions. In order to provide a more detailed picture of the firm demography in Italy, we first analyse firm entry and firm exit changes separately and then we reach to a final interpretation from a joint view of the results. Moreover, we split the time span under study into two sub-periods, 2004-2007 and 2007-2009, with the aim of taking into account the 2007 crisis. Results seem to be substantially divergent between the Southern regions, i.e. the poorest areas, and the rest of Italy. The firm demography seems to manifest higher instability over time, i.e. more entries but also more exits, in the Southern regions and this is associated with the presence of industrial mix disadvantage. On other hand, the firm demography is more stable, i.e. less entries but also less exits, in the rest of Italy and this reflects an industrial mix advantage. Such results seems to be widespread within the two macro-areas as the analysis of neighbourhood influence points out.

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## 1. Introduction

The spatial dimension of firm demography is investigated in an increasing number of studies under different perspectives. However, scholars have generally focused the attention on one at a time of the two faces of firm demography, i.e. firm entry and firm exit. For example, Andersson and Koster (2011) investigate the sources of persistence in regional start-up rates in Sweden and find a relevant influence of the regional dimension. Raspe and van Oort (2011) find that localised (spatially bounded) knowledge spillovers influence the localization decision of new firms. We could continue with a long list of studies on the impact of regional dimension on new firm formation (see, among the others, Storey, 1984; Reynolds et al. 1994; Armington and Acs, 2002; Acs and Storey, 2004; Lee et al., 2004; Cheng and Li, 2011).[1] Assuming an opposite direction of causality between regional economic context and firm entry, some studies have more recently pointed out the fact that new business formation would represent a conduit for knowledge spillovers and consequently for regional economic development (Dejardin, 2011; Acs et al., 2012). Shortly, the idea is that new knowledge is not completely commercialized by incumbent firms so that new firms are created to commercialize such knowledge. Also for the case of firm exit, we could report a long list of studies but for the sake of brevity we limit to show some examples. Huiban (2011) finds that the survival rate in a sample of French plants depends on the geographical area where plants are located. Strotmann (2007) investigates the German case and finds a higher risk of firm exit in highly agglomerated regions. Finally, De Silva and McComb (2012) provide evidence on the fact that firm density in the same industry reduces mortality rates only over large distances while increases it within very close proximity.

Another stream of literature, beyond considering the space an important dimension of firm demography, also focuses the attention on the role played by the sectoral dimension. For example, Audretsch and Keilbach (2007) assert that entrepreneurial capital[2], notwithstanding its spatially embedded nature, is endogenously created in knowledge-based sectors and exogenously in low-tech ones. Hence, regions specializing in knowledge-based sectors would benefit most from advantages in terms of new firm creation. Delgado et al. (2010) also provide evidence that the presence of complementary economic activities in a region creates externalities which enhance incentives and reduce barriers for new firm formation. Renski (2011) finds that regional industrial diversity positively affects new firm survival in several sectors and particularly in the more knowledge-intensive ones.

Following the suggestions from this last literature, we ground our contribution on the idea that firm demography is connected to both spatial and sectoral features. Hence, we believe one may reach misleading results if he looks at a single dimension.[3] In addition, we think that firm entry and firm exit are two faces of the same coin, so that we decide to first analyse the two aspects separately but then we interpret the final results in the light of a joint view. In literature, there still are not many attempts to connect spatial and sectoral dimensions in a single analysis and, moreover, to look at both firm entry and firm exit. Therefore, we think to significantly contribute to the current literature, providing then new evidence on the Italian case which may be useful for policy-makers and scholars. For our purposes, a recent version of the spatial shift-share decomposition, which was introduced by Espa et al. (2013), seems to be a suitable tool. Indeed, as Audretsch and Peña-Legazkue (2012) recently asserted, the ambiguity of causality direction in the relationship between firm demography and spatial (but also sectoral) context may determine objective obstacles in empirical modelling, so that the risk of reaching misleading results may be relevant in analyses where a causality direction is imposed. Such a problem, as argued by Espa et al. (2013), does not affect the results obtained by the shift-share analysis due to its

[1] See, moreover, all the articles included in the special issues appeared on *Regional Studies* in 1984, 1994 and 2004.
[2] Entrepreneurial capital is defined as the capacity of a region to create new firms.
[3] On this point see Cheng, 2011.

deterministic nature.[4] Moreover, the shift-share version by Espa et al. (2013), beyond traditionally looking at national, industrial mix and regional-shift components, is also able to provide more detailed evidence on the neighbourhood influence and hence to reduce the risk of misleading results. Indeed, the interpretation of neighbourhood advantage/disadvantage is generally based on a component which compares changes in a specific region with those of its neighbours (see Nazara and Hewings, 2004). In this view, it is not possible to distinguish whether the competitive effect of a specific region is mainly due to individual characteristics or neighbourhood influence. Espa et al. (2013) suggest a shift-share decomposition able to overcome this drawback. Finally, we also split the time span here investigated into two sub-periods 2004-2007 and 2007-2009, with the aim of taking into account the 2007 crisis and providing then further evidence.

The paper is organized as follows. Section 2 describes methodology. Section 3 provides information on data and preliminary analysis. Section 4 presents empirical results and Section 5 concludes.

## 2. Methodology: Spatial Shift-Share Decomposition

Recently, a new version of spatial shift-share decomposition was introduced by Espa et al. (2013) with the aim of providing a more effective tool to explore the neighbourhood influence. Starting from the traditional shift-share analysis, the business change in a region *r* may be decomposed as follows:

$$\Delta F_r = \left(F_{rT} - F_{rt}\right) = \sum_i F_{irt} g_n + \sum_i F_{irt}\left(g_{in} - g_n\right) + \sum_i F_{irt}\left(g_{ir} - g_{in}\right) \tag{1}$$

where $F_{irt}$ is the number of incumbent firms in sector *i* and region *r* at initial time *t*; $g_n$ is the national growth rate of incumbent firms over time span *t-T*; $g_{in}$ is the national growth rate of incumbent firms in sector *i* over time span *t-T*; and $g_{ir}$ is the growth rate of incumbent firms in sector *i* and region *r* over time span *t-T*. On the right-hand side of Equation 1, the first term measures the national effect, the second term is a measure of industrial mix and the third term refers to regional-shift effect.

Additionally, spatial shift-share decomposition can account for interactions across neighbouring regions (Nazara and Hewings, 2004). Let $\breve{g}_r$ to be assumed a spatial lag growth rate of incumbent firms in region *r*, the Equation 1 may then be re-written as follows:

$$\Delta F_r = \sum_i F_{irt} g_n + \sum_i F_{irt}\left(\breve{g}_{ir} - g_n\right) + \sum_i F_{irt}\left(g_{ir} - \breve{g}_{ir}\right) \tag{2}$$

where:

$$\breve{g}_{ir} = \frac{\sum_s w_{rs} F_{isT} - \sum_s w_{rs} F_{ist}}{\sum_s w_{rs} F_{ist}} \tag{3}$$

[4] Since we exploit data on the entire population of firms, our analysis is also not subject to problems, commonly affecting deterministic approaches, of sampling fluctuations.

and $w_{rs}$ is the element of a row-standardised binary weight matrix $\boldsymbol{W}$ and measures the intensity of interaction between the region $r$ and the neighbouring region $s$.[5] Spatial weight matrix $\boldsymbol{W}$ is the most common way of formalizing the structure of spatial proximity in areal data. A natural specification of this matrix does not exist, and a topological concept of spatial proximity must be arbitrarily introduced by researchers. In the case of irregular areal data (such as administrative units), the proper concept of neighbourhood should be based on the distance between centroids at regional level. The distance-based neighbourhood definition commonly used in spatial econometrics literature, and employed here, is the *critical cut-off neighbourhood*, which defines two regions as neighbours if their distance is equal, or less than equal, to a certain fixed distance (i.e. the critical cut-off). In our case, the minimum distance is used as critical cut-off, so that each region has at least one neighbour.[6]

On the right-hand side of Equation 2, the first term measures the national effect (*NS*), as in the traditional shift-share decomposition. The second term is now a measure of the neighbour-nation industry mix effect (*NNIM*) and shows a positive value when the growth rate of sector $i$ in the neighbours of region $r$ is higher than the national rate. The third term is the region-neighbour regional-shift effect (*RNRS*) and has a negative value when the regional change is worse than that recorded in the neighbouring regions, i.e. the region $r$ fails to take advantage of the positive influence of its neighbours. As suggested by Nazara and Hewings (2004), unlikely the traditional approach, the spatial shift-share decomposition includes both simple and combined effects. The combined effect, measuring differences of more than one aspect at the same time, is typically characterised by problems of interpretation. In particular, the interpretation of the neighbourhood influence is generally based on the third term of Equation 2, and this may sometimes produce misleading results. For example, if the neighbourhood effect shows a positive value but the difference in performance between neighbours and nation is negative, the advantage of the region $r$ is mainly due to individual factors rather than to neighbourhood influence. In order to overcome such drawback, Espa et al. (2013) introduced a novel type of spatial decomposition built on four simple effects. Specifically, they decompose the second term of Equation 2 into two simple effects as follows:

$$\left(\breve{g}_{ir} - g_n\right) = \left(\breve{g}_{ir} - g_{in}\right) + \left(g_{in} - g_n\right) \tag{4}$$

So that the shift-share decomposition becomes:

$$\Delta F_r = \sum_i F_{irt} g_n + \sum_i F_{irt}\left(g_{in} - g_n\right) + \sum_i F_{irt}\left(\breve{g}_{ir} - g_{in}\right) + \sum_i F_{irt}\left(g_{ir} - \breve{g}_{ir}\right) \tag{5}$$

On the right-hand side of Equation 5, the first two terms measure respectively the national and industrial mix components, as in the traditional decomposition. The third term may be interpreted as a measure of neighbour-nation regional-shift effect (*NNRS*) and the last term is the region-neighbour regional-shift effect (*RNRS*) like in Equation 2. Looking jointly at the two spatial effects (*NNRS* and *RNRS*), one can conclude more effectively on the neighbourhood influence. In particular, one can expect to have four possible scenarios: (a) a positive value for *RNRS* and a positive

[5] In our empirical analysis, the row-standardized binary weight matrix $\boldsymbol{W}$ is constructed by first assigning to each generic element $w_{rs}$ value 1 if the regions $r$ and $s$ are neighbours, and 0 otherwise. Then, dividing by the sum of the elements of the corresponding row, so that the weights add up to one for each region.

[6] In Italy, the minimum distance is 75 km for NUTS-3 regions. Increasing cut-off distances are also used to check for robustness. The results begin to change significantly precisely at the farthest distance.

value for *NNRS*; (b) a negative value for *RNRS* but a positive one for *NNRS*; (c) a negative value for *RNRS* and a negative one for *NNRS*; (d) a positive value for *RNRS* but a negative one for *NNRS*. One can conclude in favour of a competitive regional advantage or disadvantage due to neighbourhood influence only in scenarios (a) and (c), whereas in scenarios (b) and (d), a competitive regional advantage or disadvantage is due to the individual characteristics of region *r*.[7]

The spatial shift-share approach introduced by Espa et al. (2013) was developed in order to decompose the net business change, i.e. the difference of incumbent firms between the end and the beginning of the period, into spatial and sectoral components. However, the net business change incorporates both the entry flow of new firms and the exit flow of incumbent firms. As we will better discuss in Section 3, the database we here employ allows to isolate each of these categories. Therefore, we can more deeply explore the net business dynamics by decomposing the Equation 5 into two different shift-share, one for entry and one for exit. To this end, we decompose the growth rate of incumbent firms, $g_{ir}$, isolating then the specific contribution of the two flows ( $g_{ir}^{entry}$ and $g_{ir}^{exit}$ ):

$$g_{ir} = \frac{F_{irT} - F_{irt}}{F_{irt}} = \frac{\left(Entry_{irT} - Exit_{irT}\right) + ... + \left(Entry_{irt+1} - Exit_{irt+1}\right) + F_{irt} - F_{irt}}{F_{irt}} =$$

$$\frac{\left(Entry_{irT} + ... + Entry_{irt+1}\right)}{F_{irt}} + \frac{\left(-Exit_{irT} - ... - Exit_{irt+1}\right)}{F_{irt}} = \frac{\sum\left(Entry_{ir}\right)}{F_{irt}} + \frac{\sum\left(-Exit_{ir}\right)}{F_{irt}} = g_{ir}^{entry} + g_{ir}^{exit} \tag{6}$$

So that, we can separately apply the spatial shift-share analysis to firm entry and exit:

$$\Delta F_r = \sum\left(Entry_r\right) + \sum\left(-Exit_r\right) =$$

$$= \left(\sum_i F_{irt} g_n^{entry} + \sum_i F_{irt}\left(g_{in}^{entry} - g_n^{entry}\right) + \sum_i F_{irt}\left(\breve{g}_{ir}^{entry} - g_{in}^{entry}\right) + \sum_i F_{irt}\left(g_{ir}^{entry} - \breve{g}_{ir}^{entry}\right)\right) + \tag{7}$$

$$+ \left(\sum_i F_{irt} g_n^{exit} + \sum_i F_{irt}\left(g_{in}^{exit} - g_n^{exit}\right) + \sum_i F_{irt}\left(\breve{g}_{ir}^{exit} - g_{in}^{exit}\right) + \sum_i F_{irt}\left(g_{ir}^{exit} - \breve{g}_{ir}^{exit}\right)\right)$$

Finally, we adopt the interpretative scheme by Espa et al. (2013) in order to conclude on the neighbourhood influence. Of course, in the case of firm entry, we interpret a spatial (sectoral) advantage as a relatively higher growth rate of entries in a given region (sector), while in the case of firm exit, we interpret it as a relatively lower growth rate of exits in a given region (sector).[8]

## 3. Data and Preliminary Analysis

### *3.1. Data*

In this paper, we use an internationally comparable database on Italian firm demography managed by the Italian National Institute of Statistics (ISTAT), in accordance with procedures suggested by OECD and Eurostat. This database is based on the Italian Business Registers, in which statistical information on the date of registration (i.e. firm entry) or deregistration (i.e. firm exit) is yearly collected for each business unit. However, registration and deregistration may

[7] See Espa et al. (2013) for more details.
[8] Note that we can adopt the same interpretative scheme for entry and exit due to the fact that we are treating the exit as a negative flow.

also depend on non-demographic events such as changes of activity, mergers, break-ups, split-off, take-over and restructuring, so that such information does not purely represent firm demography. Therefore, the above-mentioned procedures allow to overcome such inaccuracies and to obtain a more realistic picture of firm demography with respect to that one can obtain looking at data simply extracted from Business Register.[9] Notwithstanding, much of literature on firm demography continues to use data extracted from Business Registers without any controls for the influence of non-demographic aspects. In this paper, we specifically exploit data on firm entries and exits aggregated at NUTS-3 regions level and with reference to the period 2004-2009.

*3.2. Preliminary Analysis*

Before introducing results from the shift-share decomposition, we provide a preliminary analysis on the spatial distribution of the firm entry and exit rates.[10] In Figure 1, quantile maps (a), (b), (c) display the spatial distribution across Italian NUTS-3 regions of firm entry rates. A certain degree of spatial correlation emerges from map (a), in which the period 2004-2007 is considered. Specifically, regions with relatively higher (or lower) firm entry rates are located in the Southern (or Northern) areas of Italy. The regions located in Eastern area of the Centre-North seem to exhibit the lowest firm entry rates. In map (b), we consider the period 2007-2009 but with the same quantiles of the former period. We do it in order to look at the effects of the financial crisis started in 2007. Such effects appear to be uniformly distributed across regions if we jointly look at map (b), where almost all regions manifest entry rates in the first quantile (i.e. below the 29%), and map (c), where new quantiles, which are built on the period 2007-2009, reveal a substantially unchanged spatial distribution with respect to that in map (a). In other words, the Southern regions continue to exhibit the highest rates of entry after the 2007 crisis.

Figure 2 shows the maps for the spatial distribution of the firm exit rates. As regards the visual inspection, we use the same criterion of the previous case. We first explore the data for the period 2004-2007, then for the period 2007-2009 with the two different quantile distributions. Interestingly, as one can see from map (a), the South is characterised, during the 2004-2007, by the highest firm exit rates. Therefore, in the Southern regions new firms are more easily created but at the same time they more hardly survive. In map (b), we surprisingly note that the 2007 crisis has generally caused a decreasing of the firm exit rates. This is probably due to the corresponding lower firm entry rates. For example, the decision of create new business is more prudent after the crisis so that only firms with higher probability to survive are created. Finally, the map (c) confirms that, also after the crisis, the South exhibits the highest firm exit rates.

In order to assess the results on spatial correlation obtained by visual inspections, we employ the Moran's *I* statistics (Moran, 1950). This is a global summary measure of spatial autocorrelation which can evaluate how similar the values of spatial neighbouring areas tend to be. Applied to firm entry (or exit) rates, Moran's *I* statistics is defined as follows:

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[9] Measuring firm entry and exit is not as straightforward as it might appear. It is indeed not trivial to properly identify the actual date in which a business activity is born or dead. For example, a new firm entry results in the Business Register when an entrepreneur formally registers a new business activity. However, such activity may remain just "formal" for a certain time, i.e. until the entrepreneur does not really start to operate in the market. Therefore, "timing" is not naturally defined in business demography and, to this end, OECD and Eurostat have suggested, in accordance with the definitions juridically established by the Commission Regulation (EC) No 2700/98 of 17 December 1998, some methodological procedures which allow to more properly measures business entries and exits and have at the same time data comparable and replicable at international level (see European Commission, 2007).

[10] Firm entry (or exit) rates are defined as in Equation 6.

$$I = \frac{n}{\sum_r^n \sum_s^n w_{rs}} \frac{\sum_r^n \sum_s^n w_{rs}(g_r - \bar{g})(g_s - \bar{g})}{\sum_r^n (g_r - \bar{g})^2} \quad (8)$$

where *n* represents the total number of regions; $g_r$ and $g_s$ respectively indicate the firm entry (or exit) rates in the regions *r* and *s*; $\bar{g}$ is the corresponding average regional rate; and $w_{rs}$ is the generic element of the spatial weight matrix. The spatial weight matrix, which conventionally describes the neighbourhood relationships, is not naturally defined, so that an arbitrary choice is imposed on the specification. With regard to this aspect, Moran's *I* statistics is quite sensitive to different specifications. In order to control for such a problem and to obtain robust results, the statistics is computed with respect to alternative spatial weight matrices, according to various critical cut-off distances.

For Italian NUTS-3 regions, Tables 1 and 2 list the results of spatial autocorrelation test based on Moran's *I* statistics, applied to firm entry and exit rates respectively.[11] Regardless of the period under analysis, the spatial weight matrix used and the underlying distribution of the estimator assumed, the null hypothesis of no spatial autocorrelation is always rejected. In short, both firm entry and exit rates tend to be similar among neighbouring regions. In conclusion, the neighbourhood component may substantially improve the informative power of the shift-share decomposition so that we can be, in this case, in favour of the spatial version.

## 4. Empirical Results

Results obtained by the spatial shift-share decomposition are listed in Tables A1 and A2 of the Appendix. In order to take into account the crisis started in 2007, the shift-share analysis has been carried out for two sub-periods, i.e. 2004-2007 and 2007-2009. Considering the dualism of the Italian economy (e.g. Fazio and Piacentino, 2010; Piacentino and Vassallo, 2011), we focus on the Southern regions, i.e. the poorest areas, in comparison with the rest of Italy.

Figure 3 includes two maps in which different colours display neighbourhood advantages (or disadvantages) and regional advantages (or disadvantages), in accordance with the interpretative scheme suggested by Espa et al. (2013). Looking jointly at maps (a) and (b), we note that neighbourhood advantages on firm entry are particularly localised in Southern areas, independent of the period under study. On the contrary, the Northern area is characterized by neighbourhood disadvantages and this evidence appears to be stronger after the 2007 crisis. In Figure 4, we look at the industrial mix (IM) advantages (positive values) or disadvantages (negative values) on firm entry. Looking at both maps (a) and (b), we do not observe relevant differences between the two periods. In particular, commonly to the two periods, Southern regions are strongly affected by industrial mix disadvantages on firm entry, while the picture is more complex in the Centre-North. Among others, a result which is worth mentioning is the relevant localisation of industrial mix advantages in the Western Central-Northern regions.

To sum up, in the previous section we observed higher firm entry rates in Southern regions and lower ones in Northern regions. This result is not affected by the 2007 crisis. Now, we can conclude that such relatively higher firm entry rates in the South do not depend on industrial mix advantages. In other words, new firms are more frequently created in the Southern areas but they are also created in sectors with lower firm entry rates, i.e. in less competitive sectors. Therefore, one should focus on the spatial features if he aims at exploring the determinants of firm entry rates in the South. On other hand, the geography of firm entry is more complex in the rest of Italy, especially for the industrial mix effects. In

[11] For a comprehensive set of various critical cut-off distances, *p-values* are based on both the assumptions of asymptotic normality and analytical randomization on the distribution of *I* (for more technical details, see Schabenberger and Gotway, 2005).

particular, we observe a considerable presence of industrial mix advantage in the Western area of the Centre-North. As regards the spatial effects, the neighbourhood disadvantage seems to be largely spread in the Centre-North.

Figures 5 and 6 examine spatial and sectoral effects, respectively, on firm exit. Also in this case, we compare the two periods (2004-2007 and 2007-2009) in order to take into account the effects of the 2007 crisis. It is worth remembering that here we interpret an advantage (disadvantage) as a relatively lower (higher) firm exit rate. In opposite with the firm entry case, we observe neighbourhood advantages exclusively localised in the Centre-North, and disadvantages in the South (see Figures 5). On other hand, commonly to the firm entry case, Figure 6 shows that the South is completely dominated by sectoral disadvantages while the Centre-North presents, once again, a more complex picture. In particular, the sectoral advantages are strongly localised in the Central-Eastern area of Italy. As in the previous case, we do not observe relevant differences between the two periods of analysis. Summing up, in the previous section we noted the relatively higher firm exit rates in the South. Now, we can conclude that such evidence depends on the negative influence of the industrial mix, besides the presence of neighbourhood disadvantages.

In conclusion, several results are worth mentioning. First, the results in terms of regional distribution of spatial and sectoral effects do not change relevantly in consequence of the 2007 crisis. Second, we can exclude that the highest firm entry rates in the South depends on sectoral advantages (i.e. a favourable industrial composition), so that they probably are due to spatial features. This result may be connected to the fact that the South also manifests the highest firm exit rates. Third, the rest of Italy exhibits lower firm entry rates but also better firm survival performance. This results depend on the better industrial composition in terms of both firm entry and exit, besides neighbourhood advantages in terms of barriers to firm exit. In other words, the analysis confirms the common opinion that the industry is structured on relatively more competitive sectors in the Central-Northern area of Italy so that the firm demography is more stable over time (less entries but also less exits). On other hand, the Southern industry is based on relatively less competitive sectors and this is reflected in the instability of its firm demography (more entries but also more exits).

## 5. Conclusions

A recent stream of literature points out the importance to consider both spatial and sectoral dimensions of firm demography. We ground our research on these suggestions. Moreover, empirical studies are generally focused on single aspects of firm demography, i.e. firm entry or firm exit. We think firm demography is the result of entry and exit flows of firms, so that we believe it is important to analyse both aspects and reach to some conclusions from a joint analysis. In the study of the Italian case, we try to do it. To this end, a recent version of the spatial shift-share analysis seems to be a useful tool (Espa et al., 2013). Moreover, we split the period under scrutiny into two sub-periods, 2004-2007 and 2007-2009, with the aim of considering the 2007 crisis and providing then further evidence.

As we expected, our results show relevant differences between the South, i.e. the poorest area, and the rest of Italy. In a preliminary analysis, we find that the Southern regions exhibit the highest firm entry rates but also the highest firm exit rates. From the shift-share analysis, it emerges that this evidence is related to the industrial mix component. In other words, new firms seem to be more frequently created in the Southern areas but they are also created in less competitive sectors where the survival rates are lower. Moreover, the result of neighbourhood advantage on firm entry but disadvantage on firm exit is evidence that the low competitive profile of industry is a widespread feature in the South. On other hand, new firms seem to be more strategically created in the rest of Italy and this is confirmed by the better firm survival performance. Also in this case, the results on neighbourhood influence is evidence that such feature is spatially widespread. However, the geography of firm demography is more complex in the Central-Northern area and further investigation may be oriented in this direction.

Our results suggest then some policy implications. In our opinion, the point is not to encourage the new firm formation in the South, where regions are less economically developed with respect to the rest of Italy. The crucial point should be, on the contrary, to increase the firm survival rates in these regions. To this end, it is not important if one more firm is created in the South (this could just determine a short term advantage) but it is very crucial in which sector this new firm is created. Therefore, the evidence shown in this paper is in favour of the failure of policies oriented to support new firm formation in less developed regions without an accurate industrial strategy for regional development. Unfortunately, this is occurred over past years in the South of Italy, where subsides have been granted to firms without defining a specific industrial policy. In conclusion, our results point out the importance to jointly plan regional and industrial policies in order to reduce the economic divide in Italy.

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Table A1 – Spatial shift-share analysis of firm entry change. Italian NUTS-3 regions

| | 2004-2007 | | | | | 2007-2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NUTS-3 | ∑(Entry) | NS | IM | NNRS | RNRS | ∑(Entry) | NS | IM | NNRS | RNRS |
| Torino | 56357 | 55650.8 | 636.3 | -8498.5 | 8568.5 | 42696 | 41358.8 | 438.5 | -5886.3 | 6784.9 |
| Vercelli | 3710 | 4206 | 32.6 | -146.6 | -382 | 2759 | 3083.2 | 29 | -55.5 | -297.6 |
| Novara | 8374 | 8632.3 | 39.9 | -526.8 | 228.6 | 5957 | 6365 | 31 | -373.2 | -65.7 |
| Cuneo | 11420 | 14646.2 | 120.4 | -1493.5 | -1853 | 8664 | 11107.2 | 118.5 | -978.1 | -1583.6 |
| Asti | 4406 | 5181.7 | 66.9 | -287.5 | -555.1 | 3363 | 3890.6 | 64.5 | -169.7 | -422.4 |
| Verbano-C-O | 9192 | 10490.1 | -58 | -646 | -594.1 | 6791 | 7721.1 | -23.5 | -495.5 | -411.1 |
| Biella | 3337 | 3751.5 | 156.3 | -66.7 | -504.1 | 2377 | 2797.2 | 111 | 25.2 | -556.5 |
| Alessandria | 5531 | 5831.1 | 146.1 | -1104 | 657.8 | 4291 | 4362.1 | 138.8 | -805.9 | 596 |
| Aosta | 7314 | 7987.8 | 173.7 | -1005.5 | 157.9 | 5656 | 6043.4 | 163.1 | -748.2 | 197.7 |
| Imperia | 21232 | 22158.6 | 403.1 | -1508.5 | 178.8 | 15441 | 16220.7 | 280.2 | -1158.1 | 98.1 |
| Savona | 5553 | 5475.8 | 43.7 | -361.4 | 394.9 | 4011 | 4046.3 | 33.3 | -307 | 238.5 |
| Genova | 18976 | 20871.2 | 5.2 | -1285.4 | -615 | 13718 | 15479.7 | -37.3 | -886.5 | -837.9 |
| La Spezia | 12667 | 14327 | -16.8 | -1072 | -571.3 | 9249 | 10711.5 | -30.5 | -851.7 | -580.3 |
| Varese | 3380 | 4205.7 | 60.4 | -490.6 | -395.5 | 2307 | 3169.4 | 42.6 | -470.1 | -434.9 |
| Como | 93309 | 93152.9 | 1946.3 | -7733.9 | 5943.7 | 69956 | 68906.4 | 830.1 | -7727.6 | 7947.1 |
| Sondrio | 23120 | 26717 | 617.1 | -1591.4 | -2622.7 | 16798 | 20114.4 | 383.1 | -1362.9 | -2336.7 |
| Milano | 29341 | 32023.4 | -261 | -3864.7 | 1443.2 | 21050 | 24102.6 | -199.2 | -3731.3 | 877.9 |
| Bergamo | 12306 | 12230.1 | 121.4 | -568.3 | 522.8 | 8916 | 8986.6 | 93.3 | -378.3 | 214.3 |
| Brescia | 7005 | 7957.8 | 42.8 | -520.3 | -475.3 | 5119 | 5928.8 | 34 | -454.5 | -389.4 |
| Pavia | 9000 | 10232.3 | 51.6 | -836.5 | -447.4 | 6287 | 7516 | 1 | -890.2 | -339.8 |
| Cremona | 9799 | 13355.9 | -49 | -3000.2 | -507.6 | 7062 | 9925.2 | -21.8 | -2787.6 | -53.8 |
| Mantova | 10273 | 12545 | 251.4 | -2621.6 | 98.2 | 6990 | 9379.9 | 153.4 | -2164.4 | -378.9 |
| Lecco | 22258 | 23559.5 | 159.2 | -2897.5 | 1436.8 | 15788 | 17583.9 | 71.1 | -2748.6 | 881.7 |
| Lodi | 18137 | 22503.8 | -570.8 | -2889.2 | -906.9 | 13005 | 16604.8 | -448.6 | -2835.3 | -315.9 |
| Monza-Brianza | 3456 | 4880.2 | -39.3 | -971.5 | -413.5 | 2421 | 3600.7 | -22.9 | -873.6 | -283.3 |
| Bolzano | 19141 | 22682 | -75.5 | -3729.2 | 263.7 | 13211 | 16749.9 | -132.3 | -3248.2 | -158.3 |
| Trento | 18134 | 20827.5 | 214.6 | -3126.8 | 218.7 | 12851 | 15431 | 105.4 | -2854.3 | 168.9 |
| Verona | 22634 | 26279.1 | -39.8 | -3494.9 | -110.4 | 16279 | 19596.7 | -88.1 | -3184.7 | -44.9 |
| Vicenza | 5299 | 5927.1 | -13.5 | -849.4 | 234.9 | 3978 | 4355.3 | -29.8 | -735.7 | 388.2 |
| Belluno | 10436 | 13184.3 | 50.7 | -2347.4 | -451.6 | 7498 | 9700.5 | 10.6 | -2216 | 2.9 |
| Treviso | 2743 | 2990.8 | 5.5 | -555.3 | 302.1 | 1855 | 2117 | 1.1 | -440.7 | 177.5 |
| Venezia | 4785 | 5109 | 87.7 | -503.2 | 91.5 | 3423 | 3663.9 | 47.8 | -479.5 | 190.9 |
| Padova | 6544 | 7438.9 | 98.1 | -322.1 | -670.9 | 4870 | 5541.1 | 72.9 | -325.7 | -418.3 |
| Rovigo | 11421 | 12193.5 | 115.7 | -969.1 | 80.9 | 7839 | 8848.4 | 13.7 | -877.6 | -145.5 |
| Udine | 13248 | 14056.2 | 209.3 | -1209.4 | 192 | 9116 | 10243 | 63.7 | -1110.8 | -79.9 |
| Gorizia | 16961 | 19424.3 | -164.8 | -1537.8 | -760.6 | 12145 | 14158.7 | -187.4 | -1388.6 | -437.8 |
| Trieste | 24584 | 28352.9 | 361.4 | -2836 | -1294.4 | 17453 | 20810.7 | 122.6 | -2326.4 | -1153.9 |
| Pordenone | 7140 | 8588.9 | 116.8 | -1186.3 | -379.5 | 5173 | 6189.7 | 56.1 | -995.9 | -76.8 |
| Piacenza | 8571 | 9838.1 | 173.2 | -1250.4 | -189.9 | 6048 | 7211.1 | 79.9 | -1109.3 | -133.8 |
| Parma | 9980 | 11005 | 107.3 | -1174.1 | 41.7 | 6634 | 8189.9 | 54.4 | -994.7 | -615.6 |
| Reggio Emilia | 8881 | 10487.5 | -94.3 | -926.8 | -585.4 | 6460 | 7776.8 | -78.2 | -884.4 | -354.2 |
| Modena | 10239 | 11618.5 | -100.4 | -1068.7 | -210.4 | 7559 | 8624.1 | -81.2 | -906.1 | -77.8 |
| Bologna | 7773 | 8846.1 | -193.2 | -550.5 | -329.3 | 5701 | 6605.4 | -124.7 | -480 | -299.7 |
| Ferrara | 5068 | 5383.4 | 11 | 109.1 | -435.5 | 3674 | 3993 | 1.6 | 50.7 | -371.3 |
| Ravenna | 5469 | 5399.1 | -20.8 | -378.7 | 469.4 | 4157 | 4049.4 | 7.1 | -345 | 445.4 |
| Forlì-Cesena | 11308 | 11641.4 | 61.1 | -565.5 | 171 | 8588 | 8842.1 | 105.2 | -455.8 | 96.5 |
| Rimini | 7623 | 8387.6 | -122 | -525.2 | -117.4 | 5628 | 6188.4 | -58 | -429.3 | -73.2 |
| Pesaro-Urbino | 27517 | 29649.1 | -248 | -2351.1 | 467.1 | 20338 | 21926.3 | -219.1 | -2050 | 680.7 |
| Ancona | 7933 | 8417.6 | 71.4 | -427.5 | -128.5 | 5878 | 6233.5 | 48.5 | -286.5 | -117.5 |
| Macerata | 10686 | 10743.3 | -66.2 | -525.9 | 534.7 | 8232 | 8108.5 | -44.3 | -392.5 | 560.3 |
| Ascoli Piceno | 8127 | 9283.3 | -189 | -780.2 | -187.2 | 5949 | 6893.6 | -132.7 | -754.2 | -57.7 |
| Fermo | 6399 | 7282 | 61.2 | -431.9 | -512.2 | 4652 | 5418.6 | 45.1 | -323.4 | -488.3 |
| Massa-Carrara | 5399 | 5759.7 | 82 | -145.4 | -297.3 | 3893 | 4272.5 | 53 | -93.1 | -339.4 |
| Lucca | 15517 | 16569.2 | -23.6 | -1776 | 747.4 | 11500 | 12334 | -9.3 | -1413.6 | 588.9 |
| Pistoia | 5025 | 5176.2 | 4.3 | -37.5 | -118.1 | 3845 | 3885.5 | 22 | 15.3 | -77.7 |
| Firenze | 7357 | 6704.4 | 55.1 | 1538.9 | -941.3 | 5827 | 5147.6 | 76.7 | 1364.5 | -761.8 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Livorno | 3221 | 2944.4 | 55 | 638.5 | -416.9 | 2613 | 2242.4 | 59.4 | 567.5 | -256.3 |
| Pisa | 125150 | 96502.6 | 2622.1 | 11709.7 | 14315.5 | 93888 | 71209.9 | 1578.3 | 10884.3 | 10215.5 |
| Arezzo | 12689 | 11188.8 | -77.3 | 2734.7 | -1157.1 | 9795 | 8355.6 | -26.5 | 2336 | -870.1 |
| Siena | 11041 | 9885.4 | -69.6 | 2325.9 | -1100.7 | 8400 | 7409.7 | -9.8 | 2113.7 | -1113.6 |
| Grosseto | 21050 | 14961.8 | -68.7 | 3257.4 | 2899.6 | 15827 | 10868.2 | -6.4 | 2412.9 | 2552.2 |
| Prato | 6141 | 5537.1 | -80.7 | 1444.5 | -759.9 | 4729 | 4119.2 | -36.3 | 1113.6 | -467.5 |
| Perugia | 69390 | 56044 | -1668.4 | 14987.2 | 27.2 | 50986 | 40872.1 | -956.1 | 11979.3 | -909.3 |
| Terni | 9132 | 8294.6 | -157.4 | 1804 | -809.1 | 6928 | 6244.4 | -84.8 | 1438.9 | -670.4 |
| Viterbo | 25896 | 22568.4 | -443.7 | 1542.4 | 2228.8 | 19672 | 16854 | -240.4 | 621.5 | 2436.9 |
| Rieti | 6972 | 6612.7 | 47.6 | 586.5 | -274.8 | 4623 | 3979.9 | 44.6 | 368.2 | 230.2 |
| Roma | 8404 | 7634.4 | -104.9 | -47 | 921.5 | 6231 | 5647 | -47.8 | -10.3 | 642.2 |
| Latina | 8913 | 8026.7 | 3.9 | 324.3 | 558.1 | 6541 | 5974.4 | 9 | 388.4 | 169.3 |
| Frosinone | 8728 | 8510.9 | -92.2 | 519.2 | -209.9 | 6693 | 6371 | -44 | 527.1 | -161.2 |
| L'Aquila | 4639 | 4688 | -2.3 | 921.3 | -968.1 | 3607 | 3526.8 | 10.9 | 810.6 | -741.4 |
| Teramo | 12049 | 11241.3 | -144.8 | 219.5 | 733 | 9471 | 8392.4 | -52.6 | 320.3 | 810.9 |
| Pescara | 26862 | 25591.8 | -380 | 223.1 | 1427.1 | 20258 | 19184.1 | -178.3 | 914.5 | 337.7 |
| Chieti | 10075 | 9293.8 | -149.6 | 471.9 | 458.9 | 7841 | 6919.5 | -75.4 | 449 | 547.9 |
| Caserta | 7433 | 7080 | -142.7 | 952 | -456.2 | 5946 | 5321.5 | -48.8 | 842.1 | -168.8 |
| Benevento | 18646 | 16495.2 | -400.8 | 1240.6 | 1311 | 14394 | 12448.8 | -133.6 | 1652.8 | 426 |
| Napoli | 7668 | 7656.6 | -14.5 | 975.8 | -950 | 5096 | 5436.3 | 16 | 798.4 | -1154.6 |
| Avellino | 3348 | 3686.2 | -18.6 | 219.3 | -538.9 | 2604 | 2734 | -14.4 | 163.1 | -278.7 |
| Salerno | 14892 | 13522 | -179.5 | 3338.8 | -1789.3 | 11138 | 9857.2 | -73.5 | 2663.8 | -1309.4 |
| Campobasso | 7429 | 6900.8 | -84.4 | 1286.9 | -674.3 | 5691 | 5036.2 | -33.8 | 1094.1 | -405.5 |
| Isernia | 10579 | 9471 | -269.3 | 1260.4 | 116.9 | 8071 | 6843.5 | -139.5 | 1145.8 | 221.1 |
| Foggia | 8551 | 7905.9 | -207.6 | 923.8 | -71.2 | 6317 | 5765.9 | -108.2 | 1011.9 | -352.5 |
| Bari | 21796 | 19761 | -357.8 | 1696.3 | 696.5 | 16553 | 14215.1 | -191.1 | 1492.6 | 1036.3 |
| Taranto | 12882 | 12405.6 | -80.6 | 2265.4 | -1708.5 | 9687 | 9063.6 | -13.8 | 2133.1 | -1496 |
| Brindisi | 7639 | 7290.8 | -171.5 | 842.3 | -322.6 | 5649 | 5277.4 | -90.7 | 896.8 | -434.5 |
| Lecce | 4746 | 4421.1 | -82.9 | 598.5 | -190.6 | 3533 | 3163.6 | -45.6 | 574 | -158.9 |
| Barletta-A-T | 2700 | 2764 | -37.1 | 387.9 | -414.7 | 1952 | 2001.7 | -18.6 | 375 | -406.1 |
| Potenza | 23377 | 19636.4 | -391.5 | 1676 | 2456.2 | 18288 | 14555.6 | -165.5 | 1763.8 | 2134.1 |
| Matera | 6229 | 5821 | -59.1 | 1121.1 | -654 | 4833 | 4362.8 | -8.5 | 1128.9 | -650.2 |
| Cosenza | 7458 | 6268.1 | -48.8 | 1129.2 | 109.5 | 5925 | 4627 | -16.8 | 1067.9 | 247 |
| Catanzaro | 7369 | 6670.1 | 26.3 | 207.8 | 464.8 | 5475 | 4835.2 | 34.3 | 271.3 | 334.2 |
| Reggio Calabria | 3376 | 3350.7 | -55.1 | 189.2 | -108.8 | 2462 | 2446.3 | -19.9 | 235.4 | -199.8 |
| Crotone | 13786 | 11998.4 | 113.5 | -908.1 | 2582.2 | 9967 | 8794.1 | 63.5 | 258.3 | 851.1 |
| Vibo Valentia | 5540 | 7105.8 | -23.5 | -1186.5 | -355.7 | 3758 | 5190 | -36.3 | -1054.6 | -341.2 |
| Trapani | 1975 | 1880.9 | 3.9 | 327.8 | -237.6 | 1401 | 1408.4 | 9.4 | 299.7 | -316.6 |
| Palermo | 2948 | 3155.9 | -36.6 | 96.3 | -267.5 | 2229 | 2348 | 3.5 | 162.4 | -284.9 |
| Messina | 4159 | 5063.3 | -8.1 | -221.7 | -674.6 | 3218 | 3699.5 | -11.8 | -147.4 | -322.4 |
| Agrigento | 6623 | 7934 | -82.9 | -579.4 | -648.7 | 4861 | 5929.6 | -63.9 | -463.2 | -541.5 |
| Caltanissetta | 4659 | 4470.7 | 138.6 | -261.1 | 310.8 | 3358 | 3322.2 | 82.9 | -207.8 | 160.7 |
| Enna | 9522 | 10313.6 | 23.8 | -1319 | 503.7 | 6954 | 7689.4 | 25.6 | -1199.7 | 438.7 |
| Catania | 8966 | 8642.4 | -522.5 | -711.4 | 1557.4 | 7035 | 6587 | -413.1 | -576.5 | 1437.5 |
| Ragusa | 3602 | 2912.5 | -43.2 | 305.4 | 427.3 | 2698 | 2129.8 | -19.7 | 289.6 | 298.3 |
| Siracusa | 3211 | 2906.6 | -68.3 | 346.5 | 26.2 | 2415 | 2106.3 | -31.5 | 355.5 | -15.3 |
| Sassari | 3181 | 4073.5 | 2.4 | -400.5 | -494.3 | 2365 | 3017.8 | 14.6 | -336.2 | -331.2 |
| Nuoro | 4474 | 4019.7 | 30.7 | 320.9 | 102.7 | 3665 | 3048.3 | 45.2 | 287.6 | 283.9 |
| Cagliari | 949 | 1082.4 | -5.2 | 83.9 | -212.1 | 789 | 809.3 | 3.4 | 56.3 | -80.1 |
| Oristano | 1407 | 1660.4 | -28 | 125.1 | -350.4 | 1238 | 1247.4 | -13.9 | 100.3 | -95.8 |
| Olbia-Tempio | 1856 | 1959.6 | -29.4 | 192.6 | -266.8 | 1541 | 1440.6 | -14.4 | 149.1 | -34.3 |
| Ogliastra | 19407 | 20990.6 | -26.6 | -1376.3 | -180.7 | 13360 | 15479.7 | -62 | -1021.4 | -1036.4 |
| Medio C | 4458 | 5164.4 | -331.1 | -162.3 | -213 | 3219 | 3827.6 | -228.6 | -170.8 | -209.1 |
| Carbonia-Iglesias | 7397 | 8197.3 | -435.9 | 587.2 | -951.7 | 5743 | 6107.6 | -259.8 | 529.9 | -634.7 |

Notes: ∑(Entry)= change in number of plants; NS = national effect; IM = industrial mix effect; NNRS = neighbour-nation regional-shift effect; RNRS = region-neighbour regional-shift effect.

Table A2 – Spatial shift-share analysis of firm exit change. Italian NUTS-3 regions

| | 2004-2007 | | | | | 2007-2009 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NUTS-3 | ∑(Exit) | NS | IM | NNRS | RNRS | ∑(Exit) | NS | IM | NNRS | RNRS |
| Torino | -53928.0 | -52632.9 | 52.1 | 5485.9 | -6833.1 | -42443.0 | -41934.7 | 6.3 | 5739.6 | -6254.3 |
| Vercelli | -3756.0 | -3977.9 | -35.4 | -46.8 | 304.2 | -2916.0 | -3126.1 | -28.8 | 30.8 | 208.1 |
| Novara | -8059.0 | -8164.2 | 20.9 | 250.0 | -165.7 | -6126.0 | -6453.6 | 19.6 | 244.3 | 63.8 |
| Cuneo | -10203.0 | -13851.9 | -156.4 | 1439.3 | 2366.1 | -7679.0 | -11261.9 | -140.2 | 1794.3 | 1928.8 |
| Asti | -4278.0 | -4900.7 | -56.0 | 198.5 | 480.3 | -3176.0 | -3944.7 | -47.6 | 261.8 | 554.5 |
| Verbano-C-O | -9271.0 | -9921.2 | -10.1 | 171.7 | 488.7 | -7053.0 | -7828.6 | -9.4 | 403.5 | 381.6 |
| Biella | -3080.0 | -3548.0 | -64.2 | -64.5 | 596.8 | -2322.0 | -2836.2 | -61.9 | -8.1 | 584.2 |
| Alessandria | -5106.0 | -5514.9 | -122.9 | 1160.2 | -628.4 | -4147.0 | -4422.8 | -121.8 | 1237.1 | -839.5 |
| Aosta | -7002.0 | -7554.7 | -143.3 | 662.4 | 33.5 | -5178.0 | -6127.5 | -148.0 | 811.5 | 286.0 |
| Imperia | -21682.0 | -20956.9 | -6.6 | 1168.0 | -1886.5 | -16361.0 | -16446.6 | -10.9 | 1266.9 | -1170.4 |
| Savona | -5319.0 | -5178.8 | -31.5 | 229.3 | -338.0 | -4082.0 | -4102.6 | -35.5 | 248.5 | -192.3 |
| Genova | -18036.0 | -19739.4 | 260.1 | 554.3 | 889.0 | -13753.0 | -15695.2 | 241.5 | 544.6 | 1156.1 |
| La Spezia | -11449.0 | -13550.1 | 143.3 | 802.9 | 1154.9 | -8920.0 | -10860.7 | 133.0 | 752.8 | 1054.8 |
| Varese | -2669.0 | -3977.6 | -46.4 | 753.4 | 601.6 | -2107.0 | -3213.5 | -38.2 | 654.4 | 490.4 |
| Como | -89622.0 | -88101.3 | 2072.5 | 10673.5 | -14266.7 | -70868.0 | -69865.8 | 1731.1 | 8731.2 | -11464.4 |
| Sondrio | -19611.0 | -25268.2 | -98.5 | 1620.4 | 4135.3 | -15608.0 | -20394.5 | -37.0 | 1377.4 | 3446.1 |
| Milano | -24866.0 | -30286.8 | 211.2 | 5577.5 | -367.9 | -19652.0 | -24438.2 | 208.5 | 4668.5 | -90.8 |
| Bergamo | -11458.0 | -11566.8 | -5.5 | 27.1 | 87.3 | -9284.0 | -9111.7 | -1.1 | 137.7 | -308.8 |
| Brescia | -6203.0 | -7526.3 | -13.6 | 534.6 | 802.2 | -5022.0 | -6011.4 | -7.0 | 423.2 | 573.2 |
| Pavia | -8033.0 | -9677.4 | -41.8 | 1356.8 | 329.4 | -6606.0 | -7620.6 | -5.5 | 967.9 | 52.2 |
| Cremona | -9141.0 | -12631.6 | -191.8 | 3374.4 | 308.1 | -7004.0 | -10063.4 | -181.5 | 3190.1 | 50.9 |
| Mantova | -8739.0 | -11864.7 | -89.1 | 2585.3 | 629.4 | -6699.0 | -9510.5 | -82.1 | 2236.8 | 656.7 |
| Lecco | -19728.0 | -22281.9 | 13.1 | 3968.1 | -1427.3 | -15372.0 | -17828.7 | 36.6 | 3255.7 | -835.6 |
| Lodi | -17165.0 | -21283.5 | 309.9 | 3870.8 | -62.3 | -13397.0 | -16836.0 | 306.6 | 3264.9 | -132.5 |
| Monza-Brianza | -3531.0 | -4615.6 | -29.3 | 1092.7 | 21.2 | -2507.0 | -3650.8 | -26.2 | 874.9 | 295.1 |
| Bolzano | -17022.0 | -21452.0 | 172.1 | 4010.2 | 247.7 | -13550.0 | -16983.1 | 190.6 | 3319.6 | -77.1 |
| Trento | -16491.0 | -19698.0 | -90.1 | 3645.8 | -348.6 | -12953.0 | -15645.9 | -71.3 | 2874.6 | -110.5 |
| Verona | -20106.0 | -24854.0 | 133.5 | 3831.9 | 782.7 | -15885.0 | -19869.6 | 142.3 | 3115.8 | 726.5 |
| Vicenza | -5217.0 | -5605.7 | -21.6 | 909.4 | -499.1 | -4156.0 | -4415.9 | -6.7 | 707.0 | -440.4 |
| Belluno | -10217.0 | -12469.3 | -7.9 | 1983.6 | 276.6 | -7842.0 | -9835.6 | -0.1 | 1322.7 | 671.0 |
| Treviso | -2870.0 | -2828.6 | -21.0 | 417.2 | -437.6 | -2278.0 | -2146.5 | -13.3 | 331.9 | -450.2 |
| Venezia | -5076.0 | -4831.9 | -11.9 | 22.8 | -254.9 | -3949.0 | -3714.9 | -11.6 | -168.8 | -53.7 |
| Padova | -6010.0 | -7035.5 | -36.4 | 167.1 | 894.8 | -4784.0 | -5618.3 | -33.9 | 141.9 | 726.3 |
| Rovigo | -10551.0 | -11532.3 | 34.0 | 1197.6 | -250.3 | -8666.0 | -8971.5 | 65.4 | 675.5 | -435.4 |
| Udine | -11682.0 | -13293.9 | -43.9 | 1247.4 | 408.4 | -9892.0 | -10385.6 | 19.8 | 796.3 | -322.5 |
| Gorizia | -15863.0 | -18370.9 | 235.4 | 1804.3 | 468.2 | -13201.0 | -14355.9 | 241.8 | 1220.5 | -307.4 |
| Trieste | -23465.0 | -26815.3 | 394.7 | 2881.6 | 74.0 | -18401.0 | -21100.4 | 350.8 | 1926.8 | 421.8 |
| Pordenone | -7300.0 | -8123.2 | -31.6 | 1126.8 | -272.0 | -5933.0 | -6275.8 | -23.2 | 872.4 | -506.3 |
| Piacenza | -8013.0 | -9304.6 | 5.6 | 1161.5 | 124.4 | -6418.0 | -7311.5 | 10.7 | 873.2 | 9.6 |
| Parma | -8252.0 | -10408.2 | 9.7 | 1087.0 | 1059.5 | -6538.0 | -8303.9 | 13.6 | 871.1 | 881.3 |
| Reggio Emilia | -7851.0 | -9918.8 | 40.4 | 1378.4 | 648.9 | -6484.0 | -7885.1 | 44.6 | 1097.3 | 259.2 |
| Modena | -9345.0 | -10988.5 | 45.0 | 1645.4 | -47.0 | -7550.0 | -8744.2 | 44.7 | 1189.1 | -39.6 |
| Bologna | -6853.0 | -8366.4 | 40.2 | 1030.1 | 443.1 | -5532.0 | -6697.4 | 42.4 | 613.6 | 509.4 |
| Ferrara | -4457.0 | -5091.5 | -16.5 | 345.1 | 305.9 | -3682.0 | -4048.6 | -8.6 | 120.2 | 255.0 |
| Ravenna | -5149.0 | -5106.3 | -36.5 | 303.5 | -309.7 | -3980.0 | -4105.8 | -37.3 | 242.2 | -79.1 |
| Forlì-Cesena | -9957.0 | -11010.1 | -55.2 | 683.7 | 424.6 | -7749.0 | -8965.2 | -71.4 | 437.0 | 850.6 |
| Rimini | -7447.0 | -7932.7 | 41.5 | 592.1 | -147.8 | -5776.0 | -6274.6 | 36.1 | 424.4 | 38.1 |
| Pesaro-Urbino | -26391.0 | -28041.2 | 366.4 | 2690.1 | -1406.3 | -20651.0 | -22231.6 | 329.4 | 2608.5 | -1357.3 |
| Ancona | -8217.0 | -7961.1 | -74.8 | 519.1 | -700.1 | -5932.0 | -6320.3 | -78.4 | 693.9 | -227.2 |
| Macerata | -9845.0 | -10160.7 | 58.7 | 506.6 | -249.6 | -7670.0 | -8221.4 | 53.0 | 673.9 | -175.4 |
| Ascoli Piceno | -7805.0 | -8779.9 | 65.7 | 985.8 | -76.6 | -5930.0 | -6989.6 | 65.9 | 819.1 | 174.6 |
| Fermo | -6102.0 | -6887.1 | -45.2 | 331.0 | 499.3 | -4591.0 | -5494.1 | -39.0 | 429.5 | 512.6 |
| Massa-Carrara | -4993.0 | -5447.3 | -87.3 | 448.9 | 92.7 | -3900.0 | -4331.9 | -85.1 | 476.9 | 40.1 |
| Lucca | -14082.0 | -15670.7 | 27.0 | 2532.8 | -971.2 | -11342.0 | -12505.8 | 30.6 | 1810.8 | -677.6 |
| Pistoia | -4517.0 | -4895.5 | -31.0 | 334.8 | 74.7 | -3662.0 | -3939.6 | -36.6 | 255.1 | 59.1 |
| Firenze | -6209.0 | -6340.8 | -121.8 | -1667.8 | 1921.4 | -5115.0 | -5219.3 | -111.6 | -1467.0 | 1682.8 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Livorno | -2961.0 | -2784.8 | -52.2 | -645.1 | 521.1 | -2376.0 | -2273.6 | -50.9 | -696.0 | 644.6 |
| Pisa | -118594.0 | -91269.4 | 519.1 | -4409.8 | -23433.8 | -95553.0 | -72201.3 | 287.4 | -3989.5 | -19649.6 |
| Arezzo | -11705.0 | -10582.0 | -84.9 | -2950.3 | 1912.3 | -9578.0 | -8471.9 | -87.6 | -2543.9 | 1525.3 |
| Siena | -9987.0 | -9349.3 | -117.8 | -2088.3 | 1568.4 | -8095.0 | -7512.8 | -100.6 | -3252.5 | 2770.9 |
| Grosseto | -20596.0 | -14150.4 | -267.4 | -3170.0 | -3008.2 | -16796.0 | -11019.5 | -215.1 | -2447.3 | -3114.1 |
| Prato | -5907.0 | -5236.8 | -33.0 | -1436.0 | 798.8 | -4687.0 | -4176.5 | -28.8 | -1158.7 | 677.0 |
| Perugia | -68746.0 | -53004.8 | -320.5 | -13663.9 | -1756.9 | -53948.0 | -41441.1 | -260.8 | -11598.9 | -647.2 |
| Terni | -8354.0 | -7844.8 | -35.9 | -1769.6 | 1296.3 | -6560.0 | -6331.3 | -32.5 | -1367.8 | 1171.6 |
| Viterbo | -24276.0 | -21344.6 | -223.3 | -1304.0 | -1404.1 | -19233.0 | -17088.6 | -203.7 | -1082.7 | -857.9 |
| Rieti | -6390.0 | -6254.1 | -98.9 | -81.8 | 44.7 | -8452.0 | -4035.3 | -97.2 | -168.8 | -4150.6 |
| Roma | -7313.0 | -7220.4 | -31.1 | 567.4 | -628.9 | -6307.0 | -5725.6 | -19.1 | -551.4 | -10.9 |
| Latina | -7813.0 | -7591.4 | -16.0 | 224.6 | -430.2 | -6467.0 | -6057.6 | -14.6 | -1421.5 | 1026.7 |
| Frosinone | -7779.0 | -8049.4 | -28.0 | -72.8 | 371.1 | -6465.0 | -6459.7 | -25.3 | -1883.4 | 1903.4 |
| L'Aquila | -4333.0 | -4433.8 | -62.1 | -838.4 | 1001.2 | -3409.0 | -3575.9 | -51.7 | -737.5 | 956.2 |
| Teramo | -11709.0 | -10631.7 | -208.7 | 236.5 | -1105.0 | -9263.0 | -8509.2 | -186.5 | 407.0 | -974.3 |
| Pescara | -24589.0 | -24204.0 | -176.6 | -380.5 | 172.2 | -19462.0 | -19451.2 | -161.9 | 205.8 | -54.7 |
| Chieti | -9873.0 | -8789.8 | -75.7 | -181.0 | -826.5 | -7747.0 | -7015.9 | -76.5 | 46.5 | -701.2 |
| Caserta | -7502.0 | -6696.0 | -110.8 | -641.6 | -53.5 | -5667.0 | -5395.6 | -113.8 | -377.6 | 220.1 |
| Benevento | -17184.0 | -15600.6 | -157.2 | -1693.9 | 267.7 | -13535.0 | -12622.1 | -173.3 | -358.8 | -380.7 |
| Napoli | -7793.0 | -7241.4 | -79.7 | -754.0 | 282.0 | -6110.0 | -5512.0 | -69.7 | -457.6 | -70.7 |
| Avellino | -3372.0 | -3486.3 | -35.0 | -142.4 | 291.7 | -2610.0 | -2772.1 | -29.6 | -88.3 | 280.0 |
| Salerno | -15308.0 | -12788.7 | -186.6 | -4048.1 | 1715.4 | -11870.0 | -9994.4 | -172.6 | -2834.0 | 1131.1 |
| Campobasso | -7767.0 | -6526.6 | -83.1 | -2214.4 | 1057.1 | -6041.0 | -5106.4 | -78.7 | -1267.4 | 411.4 |
| Isernia | -11654.0 | -8957.4 | -106.5 | -3298.1 | 708.0 | -8834.0 | -6938.8 | -96.1 | -1503.2 | -295.9 |
| Foggia | -8421.0 | -7477.2 | -77.5 | -1922.6 | 1056.2 | -6734.0 | -5846.2 | -67.3 | -1581.8 | 761.3 |
| Bari | -23603.0 | -18689.4 | -147.7 | -2610.6 | -2155.3 | -18408.0 | -14413.1 | -132.1 | -2202.9 | -1659.9 |
| Taranto | -13409.0 | -11732.9 | -165.9 | -2797.7 | 1287.5 | -10275.0 | -9189.8 | -137.3 | -1888.6 | 940.7 |
| Brindisi | -7873.0 | -6895.4 | -139.5 | -1746.2 | 908.1 | -6198.0 | -5350.9 | -119.7 | -1442.8 | 715.4 |
| Lecce | -5187.0 | -4181.3 | -51.3 | -860.8 | -93.6 | -4017.0 | -3207.6 | -43.0 | -647.7 | -118.7 |
| Barletta-A-T | -2623.0 | -2614.1 | -36.1 | -580.9 | 608.1 | -2156.0 | -2029.6 | -33.9 | -390.4 | 297.8 |
| Potenza | -23881.0 | -18571.5 | -211.3 | -2662.5 | -2435.7 | -18355.0 | -14758.3 | -194.2 | -2056.9 | -1345.7 |
| Matera | -5671.0 | -5505.3 | -87.1 | -1527.8 | 1449.3 | -4655.0 | -4423.5 | -76.9 | -1082.0 | 927.4 |
| Cosenza | -7767.0 | -5928.2 | -62.4 | -1258.0 | -518.4 | -6026.0 | -4691.4 | -52.5 | -848.0 | -434.1 |
| Catanzaro | -7198.0 | -6308.4 | -61.3 | 11.4 | -839.7 | -5948.0 | -4902.6 | -65.2 | -97.4 | -882.9 |
| Reggio Calabria | -3118.0 | -3169.0 | -46.6 | -170.7 | 268.3 | -2628.0 | -2480.4 | -45.4 | -205.0 | 102.7 |
| Crotone | -12639.0 | -11347.7 | -37.5 | 292.2 | -1546.0 | -10420.0 | -8916.5 | -46.0 | 40.3 | -1497.8 |
| Vibo Valentia | -5133.0 | -6720.4 | 37.6 | 1197.0 | 352.8 | -4101.0 | -5262.3 | 38.6 | 984.0 | 138.6 |
| Trapani | -1834.0 | -1778.9 | -16.1 | -262.1 | 223.1 | -1349.0 | -1428.0 | -16.1 | -410.3 | 505.5 |
| Palermo | -2735.0 | -2984.8 | -51.1 | -118.3 | 419.2 | -2204.0 | -2380.7 | -58.3 | -216.1 | 451.1 |
| Messina | -4404.0 | -4788.7 | 6.5 | 75.2 | 303.0 | -3457.0 | -3751.0 | 8.0 | 160.9 | 125.1 |
| Agrigento | -5744.0 | -7503.7 | 89.6 | 438.4 | 1231.8 | -4688.0 | -6012.1 | 88.5 | 416.4 | 819.2 |
| Caltanissetta | -4127.0 | -4228.2 | -25.9 | 193.4 | -66.2 | -3339.0 | -3368.5 | -14.5 | 139.4 | -95.4 |
| Enna | -8516.0 | -9754.3 | -57.9 | 1626.7 | -330.5 | -6806.0 | -7796.4 | -61.9 | 1297.3 | -244.9 |
| Catania | -7982.0 | -8173.8 | 256.1 | 612.7 | -677.1 | -6318.0 | -6678.8 | 263.6 | 512.3 | -415.1 |
| Ragusa | -3679.0 | -2754.5 | -38.4 | -494.6 | -391.5 | -2828.0 | -2159.5 | -38.1 | -362.2 | -268.3 |
| Siracusa | -3783.0 | -2749.0 | -53.0 | -657.4 | -323.6 | -2624.0 | -2135.7 | -51.3 | -464.8 | 27.8 |
| Sassari | -3403.0 | -3852.6 | -30.4 | 313.6 | 166.4 | -2386.0 | -3059.8 | -29.3 | 337.6 | 365.6 |
| Nuoro | -4199.0 | -3801.7 | -59.1 | -282.6 | -55.5 | -3395.0 | -3090.8 | -65.6 | -451.3 | 212.7 |
| Cagliari | -940.0 | -1023.7 | -21.7 | -40.7 | 146.1 | -764.0 | -820.6 | -21.8 | -65.8 | 144.2 |
| Oristano | -1471.0 | -1570.3 | -28.9 | -86.3 | 214.5 | -1175.0 | -1264.7 | -28.3 | -111.4 | 229.4 |
| Olbia-Tempio | -1962.0 | -1853.3 | -34.1 | -152.1 | 77.5 | -1597.0 | -1460.7 | -33.7 | -167.4 | 64.8 |
| Ogliastra | -17009.0 | -19852.3 | 271.4 | 1008.4 | 1563.5 | -13761.0 | -15695.2 | 267.0 | 912.7 | 754.6 |
| Medio C | -3880.0 | -4884.4 | 95.8 | 502.0 | 406.6 | -3239.0 | -3880.9 | 92.8 | 267.3 | 281.8 |
| Carbonia-Iglesias | -7296.0 | -7752.8 | -21.9 | -297.6 | 776.3 | -5642.0 | -6192.6 | -21.0 | -144.4 | 715.9 |

Notes: ∑(Exit)= change in number of plants; NS = national effect; IM = industrial mix effect; NNRS = neighbour-nation regional-shift effect; RNRS = region-neighbour regional-shift effect.

Table 1 – Moran spatial autocorrelation test of firm entry rates. Italian NUTS-3 regions

| | 2004-2007 | | | 2007-2009 | | |
|---|---|---|---|---|---|---|
| Critical cut-off distance (Km) | *I* | *p-value* (normality) | *p-value* (randomisation) | *I* | *p-value* (normality) | *p-value* (randomisation) |
| 75 | 0.6313 | 0.0000 | 0.0000 | 0.7071 | 0.0000 | 0.0000 |
| 95 | 0.5979 | 0.0000 | 0.0000 | 0.6624 | 0.0000 | 0.0000 |
| 110 | 0.5604 | 0.0000 | 0.0000 | 0.6369 | 0.0000 | 0.0000 |
| 120 | 0.5348 | 0.0000 | 0.0000 | 0.6110 | 0.0000 | 0.0000 |
| 150 | 0.5214 | 0.0000 | 0.0000 | 0.5894 | 0.0000 | 0.0000 |

Table 2 – Moran spatial autocorrelation test of firm exit rates. Italian NUTS-3 regions

| | 2004-2007 | | | 2007-2009 | | |
|---|---|---|---|---|---|---|
| Critical cut-off distance (Km) | *I* | *p-value* (normality) | *p-value* (randomisation) | *I* | *p-value* (normality) | *p-value* (randomisation) |
| 75 | 0.7138 | 0.0000 | 0.0000 | 0.5000 | 0.0000 | 0.0000 |
| 95 | 0.6578 | 0.0000 | 0.0000 | 0.4901 | 0.0000 | 0.0000 |
| 110 | 0.6249 | 0.0000 | 0.0000 | 0.4837 | 0.0000 | 0.0000 |
| 120 | 0.6094 | 0.0000 | 0.0000 | 0.4548 | 0.0000 | 0.0000 |
| 150 | 0.5940 | 0.0000 | 0.0000 | 0.4288 | 0.0000 | 0.0000 |

Figure 1- Spatial distribution of firm entry rates. Italian  NUTS-3 regions

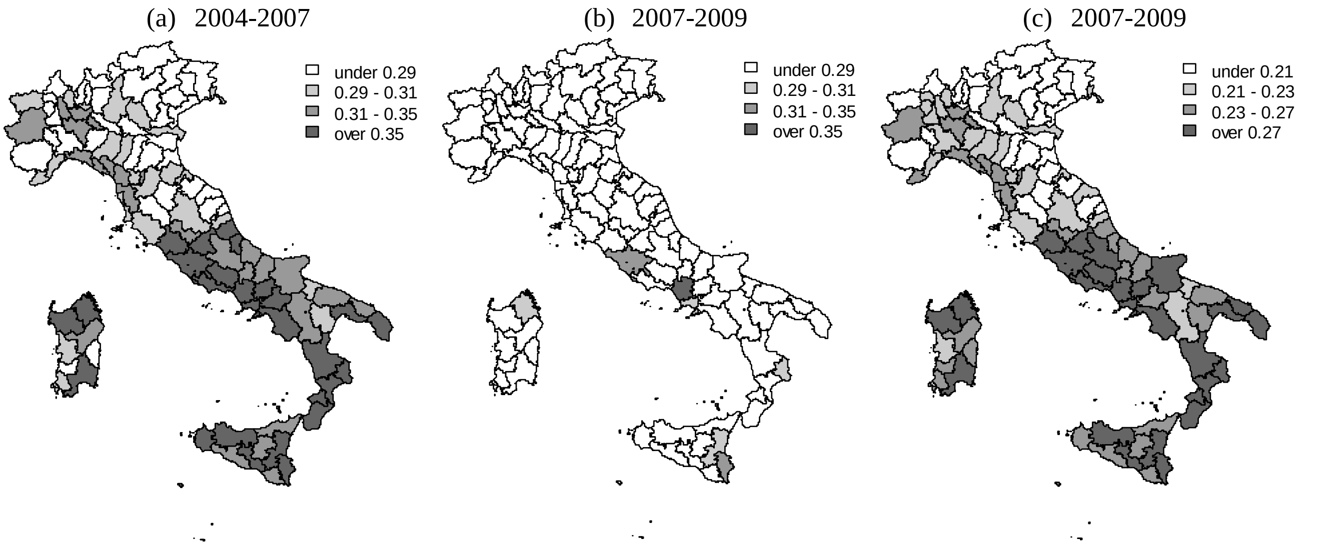


Figure 2 - Spatial distribution of firm exit rates. Italian  NUTS-3 regions

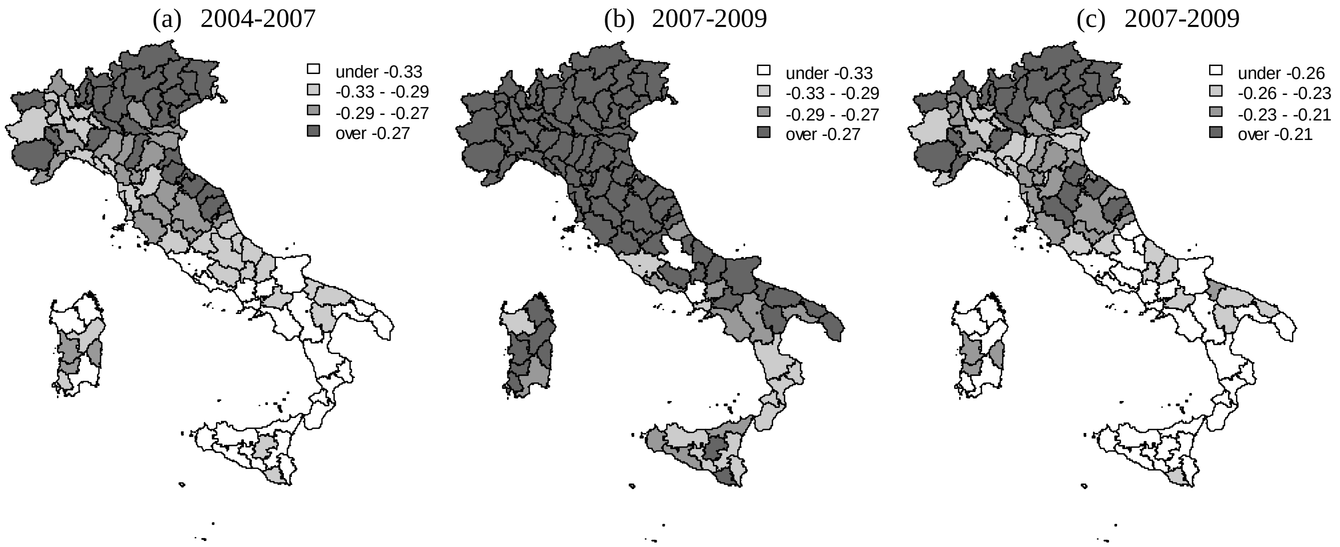

Figure 3 – Spatial components of firm entry change. Italian NUTS-3 regions

(a) 2004-2007 (b) 2007-2009

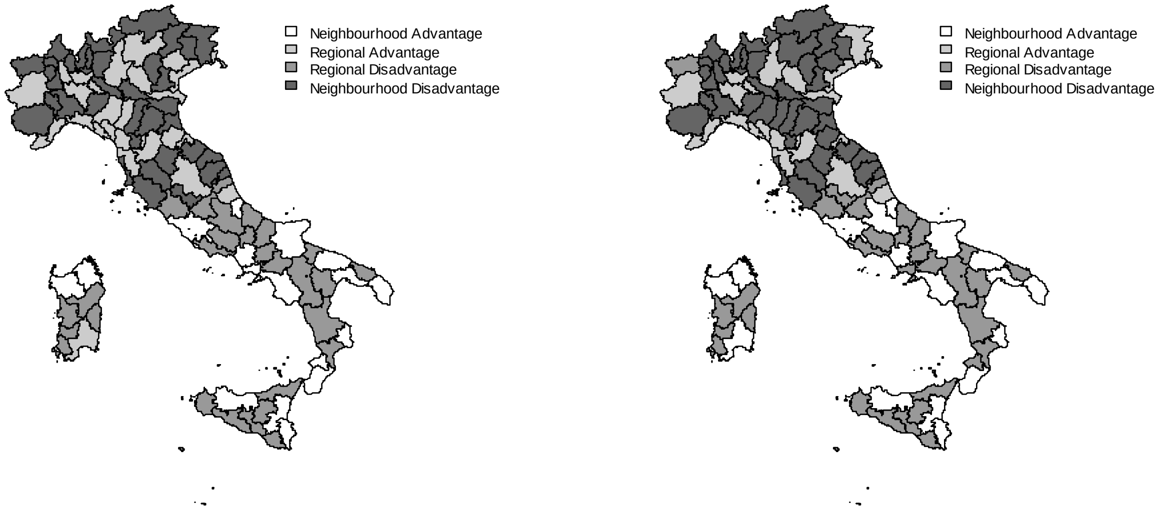


Figure 4 – Industrial mix component of firm entry change. Italian NUTS-3 regions

(a) 2004-2007 (b) 2007-2009

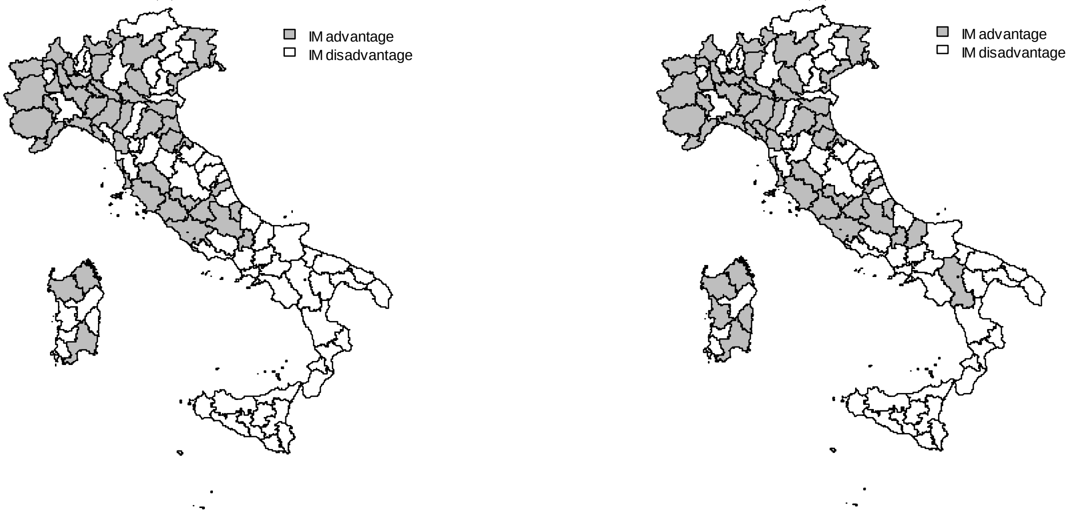

Figure 5 – Spatial components of firm exit change. Italian NUTS-3 regions

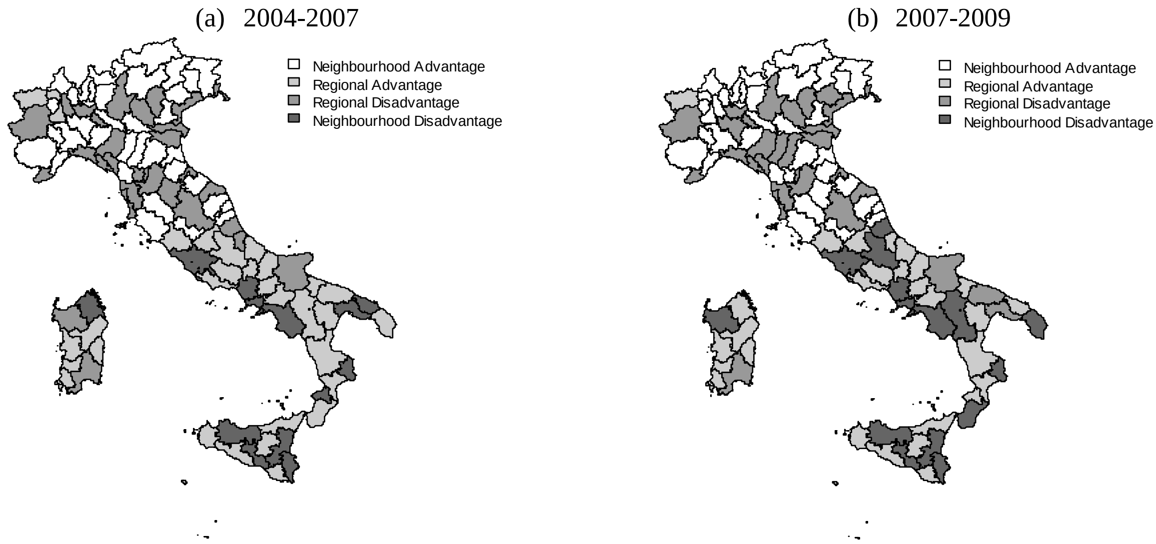


Figure 6 – Industrial mix component of firm exit change. Italian NUTS-3 regions