The Determinants of Exit in Argentina: Core and Peripheral Regions*

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Abstract

This paper analyses the regional determinants of exit in Argentina. We find evidence of a dynamic revolving door by which past entrants increase current exits, particularly in the peripheral regions. In the central regions, current and past incumbents cause an analogous displacement effect. Also, exit shows a U-shaped relationship with respect to the informal economy, although the positive effect is weaker in the central regions. These findings point to the existence of a core-periphery structure in the spatial distribution of exits.

Key words: firm exit, count data models, Argentina

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1. Introduction

The new economic geography (Krugman, 1991; Venables, 2005) and the endogenous growth theories (Aghion and Howitt, 1998) have both stressed the role of the spatial distribution of economic activity in increasing development opportunities. In this respect, the empirical evidence shows that firm dynamics may enhance regional job growth (Ghani *et al*., 2011), increase the commercialization of innovations (Audretsch *et al*., 2006), accelerate structural change (Gries and Naudé, 2010), and help discover the competitive advantages of a nation (Hausmann and Rodrik, 2003). It is therefore important to understand what determines the entry and exit of firms in developing countries.[1]

A number of previous studies have addressed these issues. However, most of them have focused on the entry process. This is the case of Lay (2003) and Wang (2006) for Taiwan, and Günalp and Cilasun (2006) and Ozturk and Kilic (2012) for Turkey, all of whom analyse industry level data. Also, within the regional science literature we should mention the studies by Naudé *et al.* (2008) for South Africa and Santarelli and Tran (2012) for Vietnam. To our knowledge, the only studies on the aggregate determinants of exit are the ones already mentioned by Lay (2003) for Taiwan and Ozturk and Kilic (2012) for Turkey.[2] This means that to date no empirical studies have been made on the determinants of regional firm exit. This paper aims to fill this gap by analysing the determinants of the (annual) number of exits in the Argentinean provinces between 2003 and 2008.[3]

Of the developing countries, Argentina has a number of features that are worth noting. First, it is a country with important regional differences in terms of wages, labour skills, growth rates and natural resources. Ultimately, regional development levels differ considerably across the country. Second, firms and people are highly concentrated around the main urban areas, particularly the capital. Third, Argentina

covers a vast territory that is organised in large administrative units. Interestingly, many other developing countries (e.g. South Africa, Brazil, Russia, Mexico and Vietnam) to some extent share these features. This means that although it may not be possible to generalise our results to all developing countries, they are likely to hold for a number of them.

Our main finding is that the spatial distribution of exits exhibits a core-periphery structure that is mostly driven by the effects of entrants, incumbents and the informal economy. First, the so-called "revolving door effect" (Audretsch, 1995), by which past entrants push firms out of the markets, is less intense in the central regions. Second, peripheral regions with a strong industrial structure (proxied by the number of past incumbents) and/or economic activity (proxied by the number of current incumbents) have fewer exits than their counterparts in the central regions. Third, the informal economy has a non-linear impact on exit. The effect is initially negative (i.e., the larger the informal economy, the fewer exits there are). However, it becomes positive when the size of the informal economy grows. So the informal economy increases the number of exits, and more so in the peripheral regions.

The rest of the paper is organised as follows. Section 2 reviews the relevant literature. It also discusses our model specification. Section 3 describes the data set. Section 4 discusses the econometric models and the main results. Section 5 concludes.

2. Literature review

2.1 Firm exit in developed countries

The industrial organization approach to the analysis of firm exit stems from the fact that exits occur when the (expected) profit falls below a particular threshold (Jovanovic, 1982; Ghemawat and Nalebuff, 1985; Klepper, 1996; Das and Das, 1996). Thus, we expect that differences in exit rates among industries to be closely related to

differences in the proportion of firms with losses. Also, the higher the rate of industry growth, the lower the number of exits will be, since more firms are expected to cover their costs and realize profits. Lastly, the exit threshold depends on the extent of exit barriers so exit rates are negatively related to the ratio of sunk to variable costs (Caves and Porter, 1976; Mac Donald, 1986; Frank, 1988).

In the regional science literature, however, the emphasis lies on the characteristics of the region where the firm is located (Baldwin *et al.*, 2000).[4] In particular, the significant variations in regional exit patterns are mainly explained by differences in regional labour markets, regional industrial composition, and the spatial concentration of economic activities and individuals. As for the differences in the labour market, the literature has concentrated on the effects of unemployment. On the one hand, an increase in unemployment may have a negative impact on exit because self-employed individuals face fewer job opportunities and are thus less prone to exit (Carree and Thurik, 1996; Lin *et al*., 2001; Nyström, 2007a, 2007b; Carree *et al*., 2008; Santarelli *et al*., 2009). On the other hand, unemployment is a proxy for the level of activity of the economy and an increase may result in an increase in the number of exits (Buzzelli, 2005; Brixy and Grotz, 2007; Fertala, 2008). As for the differences in industrial composition, the lower the complexity and diversity of the local industrial structure, the lower the ability to reallocate resources to new activities when a negative shock occurs (Kosacoff and Ramos, 1999). Thus, exit is more likely in less diversified environments. Lastly, since firms need to be close to other firms and workers to benefit from agglomeration economies and market-oriented firms from physical proximity to consumers, non-concentrated areas will tend to have more exits (Keeble and Walker, 1994; Littunen *et al*., 1998). However, agglomeration diseconomies may increase the production costs and lead to further exit of firms. This is because a higher density pushes up input prices by increasing competition for the scare resources (Agarwal and Gort, 1996; Huisman and van Wissen, 2004; Fritsch *et al*., 2006). Exits

may be higher in densely populated areas —see e.g. Buss and Lin (1990), Forsyth (2005) and Huiban (2011) for empirical evidence. There are several reasons for this. First, competition in both goods and factor markets can be higher (Agarwal and Gort, 1996; Bresnahan and Reiss, 1991). Second, the chances of finding a job, finding an entrepreneurial opportunity and/or selling the firms' assets to another venture can be higher (Huiban, 2011). Third, as discussed below, since large urban areas attract more entry, the higher share of young firms may lead to higher exits.

At the aggregate level, exits have been shown to increase during downturns (Audretsch and Mahmood, 1995; see, however, Boeri and Bellman, 1995). In particular, the level of regional demand may be relevant for services and local-market driven manufacturing activities. Also, we expect low real interest rates to discourage firm exit (Kendall *et al.*, 2010). These effects are particularly important for small firms, which are generally more likely to exit due to cost disadvantages that make them less able to compete efficiently and survive (Fotopoulos and Spence, 1998; Esteve *et al.*, 2004; Box, 2008; Carreira and Teixeira, 2011). Thus, the "liability of smallness" means that exits should be higher in regions with a large proportion of small firms. This is closely related to the "revolving door" phenomenon by which many firms exit only a few years after creation (Audretsch, 1995). The displacement effect of the new entrants has been empirically documented in developed countries both at the industry and regional levels (Arauzo-Carod *et al.*, 2007; Manjón-Antolín, 2010).

2.2 Firm exit in developing countries

We have just shown that there is an extensive empirical literature on regional firm exit. In contrast, the evidence from developing countries is scarce. We should mention the studies by Lay (2003) and Ozturk and Kilic (2012), who analyse the determinants of sectorial exit in Taiwan and Turkey, respectively, and the studies by Frazer (2005),

Eslava *et al*., (2006), López (2006), Alvarez and Görg (2009) and Alvarez and Vergara (2010; 2013), who seek to explain firm exit using size, age and productivity as the main covariates. To our knowledge, this is the first study on the determinants of regional firm exit.

In particular, we consider a set of determinants that are meant to replicate those typically used in studies on developed economies (e.g., agglomeration economies). However, we also acknowledge that there are factors that, while potentially important in developing countries, are generally not considered by studies on developed countries (e.g., the informal economy). This specification is rather ad-hoc, but it is important to stress that there is no well-established theory that provides guidelines on what the determinants of exit are in a developing country and on whether their expected effects are (dis)similar to the expected effects in a developed country. With this in mind, we argue that macroeconomic and financial factors can have a different impact on exit in developing and developed countries, whereas structural factors can have a different impact within the regions of a developing country (centre vs. peripheral regions).

First, developing economies are generally characterised by macroeconomic instability and intense cyclical variations (Stiglitz, 1998; Ocampo *et al*., 2009; Bértola and Ocampo, 2012), so vulnerability to external (and internal) shocks is expected to be higher. This means that after each crisis a considerable number of firms enter the growing markets, many of which will exit in the following years (the greater the decline, the more firms exit), thus producing a "revolving door" phenomenon that is often more intense than in developed countries. In addition, the fact that economic cycles are more pronounced in developing countries reinforces the anticyclicality of exits (i.e., it increases the likelihood that firms exit in the down swings of the business cycle). Because of the worse credit conditions in developing countries, high real

interest rates are also expected to discourage firm exit less than in developed countries (Kendall *et al.*, 2010).

Second, developing countries show marked differences in critical economic indicators among their regions, to the extent that some regions can have levels of capitalization, technology, productivity, organization and human capital requirements similar to their counterparts in advanced countries (Sunkel, 1978). A direct implication of this "structural heterogeneity" (Cassiolato *et al*., 2009) is that firm exit determinants may differ across the regions of a country.[5]

Lastly, a larger informal sector is a structural singularity of the developing countries (Schneider, 2005), which may have both negative and positive effects on exit rates. According to the "stepping stone" argument (Bennett, 2010), entrepreneurs first enter the informal sector to "test the water" before deciding whether or not to enter the formal sector. Thus, to the extent that the informal sector enables firms to acquire experience, it will reduce exit rates once these firms become formal. Also, a negative effect may be expected if there are complementarities between the formal and informal sectors (e.g., via sub-contracting activities) and/or if a competitive informal sector enhance formal manufacturing agglomeration (Gerritse and Moreno-Monroy, 2012). On the other hand, a positive effect may be expected if informal companies compete with formal firms on the basis of lower prices and/or higher flexibility. Interestingly, theoretical core-periphery models show that the competition effects between formal and informal firms may differ in central and peripheral regions (Gerritse and Moreno-Monroy, 2012).

3. The data

3.1 The dependent variable: the number of exits

Exit data used in this paper comes from the Employment and Business Dynamics Observatory (EBDO) of the Ministry of Labour and Social Security of Argentina. More specifically, the database includes information about the number of entries, exits and incumbents based on all manufacturing (formal and private) firms with at least one employee registered with the Social Security (i.e., the exit data we analyse do not contain information on informal activities). This means that our data set does not contain information on either public or informal employment. Moreover, the EBDO handles changes in firm codes that do not reflect true market entries and exits. In general, a firm is considered closed when it does not declare employees for a period of twelve months. However, spurious exits caused by the displacement of a whole firm's workforce from firms that "exit" to become "new" firms have been identified and excluded. Lastly, we restrict the analysis to firms that declare that most of their workforce is located in the assigned jurisdiction. This means that branch offices or subsidiaries located in other jurisdictions are excluded from our data set. All in all, this is the most up-to-date, comprehensive, reasonably long-term and spatially disaggregated data source currently available for firm demography studies in Argentina.

Data is available for the 23 Argentinean provinces and the Capital Federal city. These are our units of observation. However, the Buenos Aires Province is actually divided into Gran Buenos Aires and the rest of the province. We also decided to drop the province of Río Negro because of missing data in most of the explanatory variables we considered. Therefore, although there are 25 jurisdictions in the database, we ultimately provide results for only 24. Thus, our dependent variables are the number of annual exits in each jurisdiction between 2003 and 2008. We start our analysis in 2003

to avoid the structural break caused by the economic and political crisis of the end of 2001 that led to the devaluation of the Argentinean peso in January 2002. Including these years of turmoil would have completely distorted the results. We finish our analysis in 2008 because this was the last year available in the EBDO dataset when this investigation was initiated. Table 1 shows the evolution of entries, exits and incumbents over the period of analysis.

[INSERT TABLE 1 HERE]

Exits followed an increasing path after the first two years of stability (2003-2004). According to the MTEySS (2007), this was largely driven by new ventures after the deep economic recession of 2000-2001 (deferred projects along with strictly new ventures encouraged by better macroeconomic conditions). Thus, while entries in 2003-2005 doubled the entries in 2000-2002, exits increased at an average rate of 20% after 2005. Additionally, the slowdown in the net entry in 2008 is explained by the international financial crisis, the gradual appreciation of the real exchange rate and some internal conflicts (Katz and Bernat, 2011).

Figure 1 shows that the spatial distribution of these exits is not homogeneous, since most concentrate on the richest five regions: namely, the Capital Federal city and the provinces of Gran Buenos Aires, the rest of Buenos Aires province, Santa Fe and Córdoba. These "central regions" cover roughly 22% of the surface of the country but concentrate about 80% of the workers, incumbent firms and exiting firms. Also, according to the National Institute of Statistics and Censuses (INDEC, 2005), about two thirds of the graduates, expenditures on science and technology activities, industrial value added, and exports of manufactured products are concentrated in these regions. Thus, there is clear a core-periphery pattern in the spatial distribution of the economic activity in Argentina.

[INSERT FIGURE 1 HERE]

The existence of a different pattern of exit in the central and peripheral regions is emphasized in Figure 2, where we plot the evolution of the number of exits in both sets of provinces. Notice that both the levels of the variable and the slope of the curve differ. Exits follow an increasing path in both sets of provinces, but at a higher rate in the richest. The combined result is that the number of exits in Argentina practically doubled during the period of analysis. Also, since the increase in the number of entries was smaller, the population of firms shrank (see Table 1).

[INSERT FIGURE 2 HERE]

3.2 Explanatory variables

We used data from the EBDO and the National Household Survey (NHS) to construct our vector of explanatory variables (the size of the provinces in km^2 comes from the Military Geographical Institute). The distinction is important because the information contained in the EBDO database refers to the whole province, while the NHS is performed by the National Institute of Statistics and Census (INDEC) on samples of families in 31 urban areas ("aglomerados"). Nevertheless, we were obliged to use the NHS data because no statistical source provides yearly information on demographic and/or socioeconomic characteristics of the Argentinean provinces (population censuses, for example, are performed every 10 years).[6]

In particular, we were able to construct variables related to the evolution of economic activity, the labour market, the industrial structure, the existence of agglomeration economies and the number of entries. As discussed in the section above, these factors

are widely used in studies on developed countries. We also included among the covariates a measure of the informal economy, which is a structural singularity of the developing countries (Schneider, 2005) and needs to be taken into account and the square of this variable to account for non-linear effects. Lastly, we explored the existence of core-periphery differences by including the products of a dummy that identifies the richest provinces (the Capital Federal city, Gran Buenos Aires, the rest of Buenos Aires province, Santa Fe and Córdoba) with all the regional determinants previously mentioned. Year dummy variables were also included to control for macroeconomic factors. These were preferred to macroeconomic variables such as e.g. GDP growth because of the problems of measuring these aggregates. The GDP growth in local currency is inaccurate because official inflation figures have not been reliable since 2007 and the GDP growth in US dollars is similarly misleading because of the severe devaluation of the Argentinean peso in 2002 (more than 200%) and the consequent gradual appreciation. Notice also that we have not included measures of credit access in our set of explanatory variables. Actually, we explored the use of the number of loans granted i) to manufacturing, ii) per firm and iii) per employee. However, these variables were statistically non-significant and results did not differ substantially from the ones reported in Table 3. We consequently decided not to include these variables in our final specifications.

Table 2 reports the definition, statistical sources and descriptive statistics of the explanatory variables used in this study. We have included a column with the expected sign of the associated coefficient. Next we briefly review the arguments and evidence supporting these expected signs.[7]

[INSERT TABLE 2 HERE]

Business cycle. We use the rate of variation of employment in all formal firms (alternatively, the rate of variation of unemployment) to proxy for the evolution of economic activity. The coefficient of this variable is expected to be negative (positive for the rate of variation of unemployment), thus reflecting the procyclicality of exits.

Labour. We use wages and the unemployment rate to assess the impact of the labour market on firm exit. Wages correspond to the average monthly wage of private registered workers, in nominal terms because official inflation rates in Argentina have not been reliable since 2007. We expect a positive sign for this variable. As for the unemployment rate, we cannot say, a priori, what its impact on exit will be.

Industrial structure. The industrial structure of the province is approximated using the Hirschman-Herfindahl Index, which measures lack of diversity. We expect this variable to impact positively on exit, since firms located in less diversified environments are more vulnerable to external shocks. We also control for the previous industrial activities carried out in a province using the average number of incumbents 7, 6 and 5 years before (i.e. a 3-year centered moving average). We expect past incumbents to have developed a favourable business environment and supporting institutions that hamper exit. However, changes in the conditions that determine profitability (the high macroeconomic volatility of developing countries affects the exchange rate, credit conditions, tax policy, etc.) and the lack of continuity in industrial policies can mitigate this effect.

Spatial concentration. We have included population density and its square, which have been widely used as proxies for agglomeration and agglomeration diseconomies, respectively. Both positive and negative signs are possible for the density coefficient, while a positive sign is expected for its square. We have also included the number of incumbent firms as an additional measure of the agglomeration of economic activity.

Entry rates. We use the (lagged) number of entries to account for the interdependence between entries and exits. We expect this variable to show a positive coefficient.

Informal economy. We use the ratio of non-registered workers to total workers as a proxy for the regional productive structure (e.g. the seasonality and/or low productivity of certain activities may facilitate the growth of the informal sector) and/or the lack of government controls over informal economy. The impact of this variable on exit is ambiguous. A positive sign may arise if formal firms compete for the same resources as informal firms and/or formal firms become informal when facing difficulties. However, a negative sign is expected if formal firms buy inputs to the informal sector, thus lowering costs and/or increasing flexibility.

4. Econometric modelling and estimation results

Given the definition of our dependent variable, we rely on panel count data models to estimate the impact of exit determinants (Cameron and Trivedi, 1998; Ilmakunnas and Topi, 1999). Panel data models were preferred to cross-section estimates on the grounds of two empirical tests. First, likelihood ratio tests on the variance of the individual effects always yield statistically significant results, thus rejecting the validity of pooled estimates (Cameron and Trivedi, 2009). Second, we tested the assumption that observations are indeed independent across the years studied by computing the covariance matrix of the year vector of Pearson-residuals from the pooled Poisson regression model (see Hausman *et al.,* 1984 for details). We found large values in the off diagonal elements of the matrix in all the specifications, which supports the independence assumption that sustains panel data models.

It is also interesting to note that there are no zeros in the dependent variable. That is, in each jurisdiction-year pair of our sample we have a strictly positive number of exits.

This is why we concentrate on the estimation of Poisson and Negative Binomial models (Cameron and Trivedi, 1998). In particular, in Table 3 we report results from the Poisson fixed effects model.[8] Our choice is based on the results from a number of tests (see the bottom rows of Table 3). First, the ratio of the Pearson goodness-of-fit statistic to the degrees of freedom of a Poisson model with province dummy variables is close to one. As Allison and Waterman (2002) argue, this indicates that there is no overdispersion in the data. Second, the Durbin-Hu-Hausman test does not reject the null hypothesis of no correlation between the covariates and the individual effect, which means that the random effects model yields inconsistent estimates. Lastly, Poisson fixed effects estimates provide the best fit according to the Akaike Information Criterion (AIC).

[INSERT TABLE 3 HERE]

Let us first consider the results from the specification that contains variables which are widely used in studies on developed countries. These are reported in the first column in Table 3. What is most striking about these estimates is their lack of statistical significance. In particular, only the level of wages and the measure of agglomeration diseconomies show statistically significant coefficients. Also, these findings hold when we include our proxy for the informal economy. These results are reported in the second column of Table 3. The fit of the model is now better and our measure of the informal economy and its square are both statistically significant. However, the rest of the coefficients and their significance remain practically unaltered.

We now go on to consider the results obtained when the cross-products of the regional variables are included. Table 3 reports these results in the third column (without the cross-products with the informal economy measures) and fourth column (with these cross-products).[9] The first thing to point out is that, unlike our previous specifications,

a number of variables are now statistically significant: namely, the rate of unemployment, the number of lagged entries, the density measure, the industrial tradition and the number of incumbents. In particular, the negative impact of the rate of unemployment may be due to the lower cost of the workforce (not that so in the central provinces) and/or reflect the small chances of finding a job by entrepreneurs closing down their business (whereas the positive impact in the central provinces may reflect that these chances are higher). Also, the negative and positive coefficient of the density and its square is consistent with the existence of (dis)agglomeration economies. On the other hand, wages are no longer significant. The fit of the model, however, improves.

Moreover, the cross-products terms reveal that the spatial distribution of exits exhibits a core-periphery structure whose main explanatory factors are the number of lagged entrants, the number of past and current incumbents, and the size of the informal economy (the unemployment rate and the HH index only matter when the informal economy is not considered). In particular, rich provinces seem to be more able to retain firms that are expelled from the markets by the new entrants. In other words, the so-called "revolving door effect" is more intense in the other provinces. Also, there are fewer exits in provinces that have a stronger industrial tradition (proxied by the number of past incumbents) and more economic activity (proxied by the number of current incumbents). Further, these effects are particularly strong in the less rich provinces. Lastly, the existence of a small informal economy in the province prevents exit. This may be related to the lower costs and/or higher flexibility that are inherent to the informal hiring. However, the informal economy hastens exit when it grows beyond a certain level, and, therefore, starts competing for resources also exploited by formal firms.

We conclude by noting that our results are robust to alternative specifications of the model. In particular, we dropped the number of two-year lagged entries (i.e., we estimated the model including only the entries lagged one year), replaced the rate of variation of employment in all formal firms by the rate of variation in unemployment, replaced density and its square by the ratio between the population in the main urban areas of the province ("aglomerados") and the total population of the province, and replaced the rate of variation of employment in all formal firms by the rate of variation in unemployment and density and its square by the ratio between the population in the main urban areas of the province ("aglomerados") and the total population of the province. Estimates from these alternative specifications (available upon request) show that although some of the coefficients vary in value and/or statistical significance with respect to those reported in Table 3, most of the conclusions still hold.

5. Conclusions

There is an extensive empirical literature on firm exit. However, little is known about the determinants of firm exit in developing countries. This paper aims to fill this gap in the literature by analysing the impact of regional factors on the yearly number of exits in the Argentinean provinces using panel count data models. We find that while past entrants increase current exits mostly in the peripheral regions, current and past incumbents cause an analogous displacement effect but mostly in the central regions. We also find that there is a U-shaped relationship between exits and the informal economy, particularly in the peripheral regions.

In general, these findings can be useful for policy makers seeking to prevent firms from exiting in certain areas. But they can also be helpful in the implementation and evaluation of related policies. To illustrate, entry promoting policies can be used as an instrument to boost economic activity in the more depressed areas. However, our results indicate that such policies may ultimately cause more exits. This negative side

effect should thus be taken into account when assessing the welfare implications of these policies. Also, it has been suggested that the informal economy hampers the economic development of the (lagged) regions. However, our results indicate that, these concerns are justified with regard to exits only when the size of the informal economy is substantial. Moderate levels of informality, on the other hand, should not be a major concern. More generally, our finding that the determinants of exit may have opposite effects in central and lagged regions is a warning for policy makers operating in developing countries where the measures applied to the whole country are usually based on results and experiences taken only from the central regions.

As for the future extensions of this work, we can name at least two. First, we will explore the use a more disaggregated unit of observation. Given the lack of reliable data on smaller geographical units (municipalities, counties and/or metropolitan areas), using a sectorial breakdown will not only allow us to incorporate industry-specific variables but to reduce the degree of heterogeneity in the regional units. We will also explore the differences between exit rates of firms of different sizes. This can be seen as a way to incorporate one of the main firm-level factors that determines exit.

References

Agarwal, R., & Gort, M. (1996). *The Evolution of Markets and Entry, Exit and Survival of Firm., The Review of Economics and Statistics, 78*, 489-498.

Aghion, P., & Howitt, P. (1998). *Endogenous Growth Theory.* MIT Press.

Allison, P.D., & Waterman, R.P. (2002). Fixed-Effects Negative Binomial Regression Models. *Sociological Methodology, 3,* 247-265.

Álvarez, R., & Görg, H. (2009). *Multinationals and plant exit: Evidence from Chile*. *International Review of Economics & Finance*, *18* (1), 45-51.

Álvarez, R., & Vergara, S. (2013). *Trade exposure, survival and growth of small and medium-size firms. International Review of Economics & Finance*, *25,* 185-201.

Álvarez, R., & Vergara, S. (2010). Exit in Developing Countries: Economic Reforms and Plant Heterogeneity. *Economic Development and Cultural Change*, *58* (3), 537-561.

Arauzo-Carod, J. M., Manjón-Antolín, M., Martín, M., & Segarra, A. (2007). Regional and sector-specific determinants of industry dynamics and the displacement–replacement effects. *Empirica*, *34* (2), 89-115.

Audretsch, D. B. (1995): *Innovation and industry evolution*. The MIT Press.

Audretsch, D. B., Keilbach, M. C., & Lehmann, E. E. (2006). *Entrepreneurship and economic growth*. USA: Oxford University Press.

Audretsch, D. B., & Mahmood, T. (1995). New Firms Survival: New Results Using a Hazard Function. *The Review of Economics and Statistics, 77* (1), 97–103.

Baldwin, J. R. B., Dupuy, L., & Richard Gellatly, G. (2000). *Failure Rates for New Canadian Firms: New Perspectives on Entry and Exit.* Ottawa, Canada: Statistics Canada.

Bartelsman, E., Haltiwanger, J., & Scarpetta, S. (2004). Microeconomic Evidence of Creative Destruction in Industrial and Developing Countries. Institute for the Study of Labor, IZA, Discussion Paper nº 1374. The World Bank, Policy Research Working Paper nº 3464.

Bennet, J. (2010): "Informal firms in developing countries: entrepreneurial stepping stone or consolation prize?", *Small Business Economics* **34**: 53–63.

Bértola, L., & Ocampo, J.A. (2012). *The Economic Development of Latin America since Independence*. Oxford University Press.

Boeri, T., & Bellman, L. (1995). *Post-Entry Behaviour and the Cycle: Evidence from Germany*. *International Journal of Industrial Organization, 13* (4), 483-500.

Box, M. (2008). The death of firms: exploring the effects of environment and birth cohort on firm survival in Sweden. *Small Business Economics, 31,* 379-393.

Bresnahan, T. F., & Reiss, P. C. (1991). Entry and competition in concentrated markets. *Journal of Political Economy*, *99* (5), 977-1009.

Brixy, U., & Grotz, R. (2007). *Regional patterns and determinants of birth and survival of new firms in Western Germany. Entrepreneurship & Regional Development, 19* (4), 293-312.

Buss, T. F., & Lin, X. (1990). Business survival in rural America: A three-state study. *Growth and Change*, *21,* 1–8.

Buzzelli, M. (2005). What explains firm transience in house-building? A regional analysis of Ontario, Canada, 1991 and 1996. *Regional Studies, 39* (6), 699–712.

Calá, D.; Manjón-Antolín, M. & Arauzo-Carod, J.M. (2014). Regional determinants of firm entry in a developing country, *Papers in Regional Science*, forthcoming.

Calá, C.D., & Rotondo, J.S. (2012). Dinámica empresarial en la industria argentina. Un análisis provincial para el período 2003-2008. *Revista Realidad Económica, 267,* 138-170.

Cameron, A.C., & Trivedi, P.K (2009). *Microeconometrics Using Stata*, Stata Press.

Cameron, A.C., & Trivedi, P.K (1998). *Regression Analysis of Count Data*, Cambridge: Cambridge University Press.

Carree, M., Santarelli, S., & Verheul, I. (2008). Firm entry and exit in Italian provinces and the relation-ship with unemployment. *International Entrepreneurship Management Journal, 4,* 171–186.

Carree M., & Thurik R (1996). Entry and exit in retailing: incentives, barriers, displacement and replacement. *Review of Industrial Organization, 11* (2), 155-172.

Carreira, C., & Teixeira, P. (2011). The shadow of death: analysing the pre-exit productivity of Portuguese manufacturing firms. *Small Business Economics,* 36, 337–351.

Cassiolato, J.E., Pagola, C.B., & Lastres, H.M. (2009). Technical Change and Structural Inequalities: Converging Approaches to Problems of Underdevelopment. In W.J. Drechsler, R. Kattel, & E.S., Reinert (Eds.), *Techno-Economic Paradigms: Essays in Honour of Carlota Perez*. Anthem Press.

Caves, R., & Porter, M. (1976). Barriers to exit. In R. Masson and D. Qualls (Eds.), *Essays on industrial organization in honour of Joe Bain*, Cambridge, MA: Ballinger.

Das, S., & Das, S. (1996). Dynamics of entry and exit of firms in the presence of entry adjustment costs. *International Journal of Industrial Organisation, 15,* 217-241.

ECLAC (Economic Commission for Latin America and the Caribbean) (2002). The integration of Latin America and the Caribbean in global trade and production circuits. In *Globalization and Development*, Ch. 6, ECLAC.

Eslava, M., Haltiwanger, J.C., Kugler, A.D., & Kugler, M. (2006). Plant turnover and structural reforms in Colombia. IMF Staff Papers, 53, 58–75.

Esteve, S., Sanchís, A., & Sanchís, J. (2004). The Determinants of Survival of Spanish Manufacturing Firms. *Review of Industrial Organization, 25,* 251-273.

Fertala, N. (2008). The shadow of death: do regional differences matter for firm survival across native and immigrant entrepreneurs?. *Empirica, 35,* 59–80.

Fotopoulos, G., & Spence, N. (1998). Accounting for Net Entry into Greek Manufacturing by Establishments of Varying Size. *Small Business Economics, 11,* 125–144.

Frank, M. (1988). An Intertemporal Model of Industrial Exit. *The Quarterly Journal of Economics, 103* (2), 333-344.

Frazer, G. (2005). Which firms die? A look at manufacturing firm exit in Ghana. *Economic Development and cultural change*, *53* (3), 585-617.

Forsyth, G. D. (2005). A note on small business survival in rural areas: The case of Washington State. *Growth and change, 36,* 428–440.

Fritsch, M., Brixy, U., & Falck, O. (2006). The effect of industry, region, and time on new business survival. *Review of Industrial Organization, 28,* 285-306.

Gerritse, M., & Moreno-Monroy, A.I. (2012). Informal sector and manufacturing location: in search of the missing links. *Spatial Economic Analysis*, 7(2): 179-201.

Ghani, E., Kerr, W. R., & O'Connell, S. (2011). *Promoting Entrepreneurship, Growth, and Job Creation*. Edited by Ghani, E. Ch. 7, 166-199.

Ghemawat, P., & Nalebuff, B. (1985). Exit. *RAND Journal of Economics, 16,* 184-194.

Günalp, B., & Cilasun, S.M. (2006). Determinants of Entry in Turkish Manufacturing Industries. *Small Business Economics, 27,* 275–287.

Gries, T., & Naudé, W. (2010). Entrepreneurship and structural economic transformation. *Small Business Economics*, *34*(1), 13-29.

Hausman, J., Hall, BH., & Griliches, Z. (1984), Econometric Models for Count Data with an Application to the Patents-R & D Relationship. *Econometrica*, *52* (4), 909-938.

Hausmann, R., & Rodrik, D. (2003). Economic development as self-discovery. *Journal of Development Economics*, *72* (2), 603–633.

Huiban, J. P. (2011). The spatial demography of new plants: urban creation and rural survival. *Small Business Economics*, *37* (1), 73-86.

Huisman, C., & van Wissen, L. (2004). Localization effects of firm startups and closures in the Netherlands. *Annals of Regional Science, 38,* 291-310.

Ilmakunnas, P., & Topi, J. (1999). Microeconomic and Macroeconomic Influences on Entry and Exit of Firms. *Review of Industrial Organization, 15,* 283–301.

INDEC (2005). *Anuario Estadístico de la República Argentina*. Buenos Aires, INDEC.

Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica, 50* (3), 649–70.

Katz, J., & Bernat, G. (2011). Exit-entry, productivity growth and structural change in response to changes in macroeconomic policy: evidence from Argentina. *Innovation and Development*, *1* (2), 227-244.

Keeble, D., & Walker, S. (1994). New Firms, Small Firms and Dead Firms: Spatial Patterns and Determinants in the United Kingdom. *Regional Studies, 28* (4), 411-427.

Kendall, J., Mylenko, N., & Ponce, A. (2010). Measuring Financial Access around the World. Policy Research Working Paper 5253, The World Bank, March.

Klepper, S. (1996). Entry, exit, growth and innovation over the product cycle. *American Economic Review, 86* (3), 562–583.

Kosacoff, B., & Ramos, A. (1999). El debate sobre política industrial. *Revista de la CEPAL, 68,* 35-60.

Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, *99*, 483-499.

Lay, T.J. (2003). The Determinants of and Interaction between Entry and Exit in Taiwan´s manufacturing. *Small Business Economics, 20,* 319-334.

Lin, Z., Picot, G., & Compton, J. (2001). The entry and exit dynamics of self-employment in Canada. *Small Business Economics, 15,* 105–125.

Littunen, H., Storhammar, E., & Nenonen, T. (1998). The survival of firms over the critical first 3 years and the local environment. *Entrepreneurship & Regional Development, 10* (3), 189-202.

López, R. A. (2006). Imports of intermediate inputs and plant survival. *Economics Letters*, *92* (1), 58-62.

Love, J.H. (1996). Entry and exit: a county-level analysis. *Applied Economics 28,* 441-451.

MacDonald, J.M. (1986). Entry and Exit on the Competitive Fringe. *Southern Economic Journal, 52*, 640-652.

Manjón-Antolín, M. C. (2010). Firm size and short-term dynamics in aggregate entry and exit. *International Journal of Industrial Organization, 28* (5), 464-476.

MTEySS (2007). La creación de empresas durante la etapa post convertibilidad (2003-2005): Impacto sobre el empleo asalariado registrado. In *Salarios, empresas y empleo 2003-2006*, Series Trabajo, ocupación y empleo, nº 5. National Ministry of Labour, Employment and Social Security. January.

Naudé, W., Gries, T., Wood, E., & Meintjies, A. (2008). Regional determinants of entrepreneurial start-ups in a developing country. *Entrepreneurship & Regional Development: An International Journal*, *20* (2), 111-124.

Nyström, K. (2007a). An industry disaggregated analysis of the determinants of regional entry and exit. *Annals of Regional Science, 41,* 877–896.

Nyström, K. (2007b). Patterns and determinants of entry and exit in industrial sectors in Sweden. *Journal of International Entrepreneurship, 5,* 85–110.

Ocampo, J. A., Rada, C., & Taylor, L. (2009). *Growth and Policy in Developing Countries: A Structuralist Approach*. New York: Oxford University Press.

Ozturk, S., & Kilic, C. (2012). Patterns and determinants of entry and exit in Turkish manufacturing industries. *International Journal of Arts and Commerce*, *1* (5), 107-118.

Santarelli, E.; Carree, M., & Verheul, I. (2009). Unemployment and Firm Entry and Exit: An Update on a Controversial Relationship. *Regional Studies, 43* (8), 1061-1073.

Santarelli, E., & Tran, H.T. (2012). Growth of Incumbent Firms and Entrepreneurship in Vietnam. *Growth and Change*, *43* (4), 638–666.

Schneider, F. (2005). Shadow economies around the world: what do we really know?. *European Journal of Political Economy*, *21,* 598–642.

Stiglitz, J. (1998). Towards a New Paradigm for Development: Strategies, Policies, and Processes. Given as the 1998 Prebisch Lecture at UNCTAD, Geneva, October 19.

Sunkel O. (1978). La dependencia y la heterogeneidad estructural. *Trimestre Económico*, *45* (1), 3-20 México, D.F.

Venables, A. J. (2005). Spatial disparities in developing countries: cities, regions, and international trade. *Journal of Economic Geography*, *5* (1), 3-21.

Wang, S. (2006). Determinants of New Firm Formation in Taiwan. *Small Business Economics*, *27,* 313–321.

Table 1. Number of entries, exits and incumbents in Argentina (2003 – 2008)

Year	Entry	Exit	Incumbents
2003	4,986	2,330	42,754
2004	5,994	2,326	45,234
2005	5,486	2,929	48,317
2006	6,264	3,623	49,987
2007	5,886	4,358	51,796
2008	5,389	5,103	52,417

Source: authors from data in EBDO

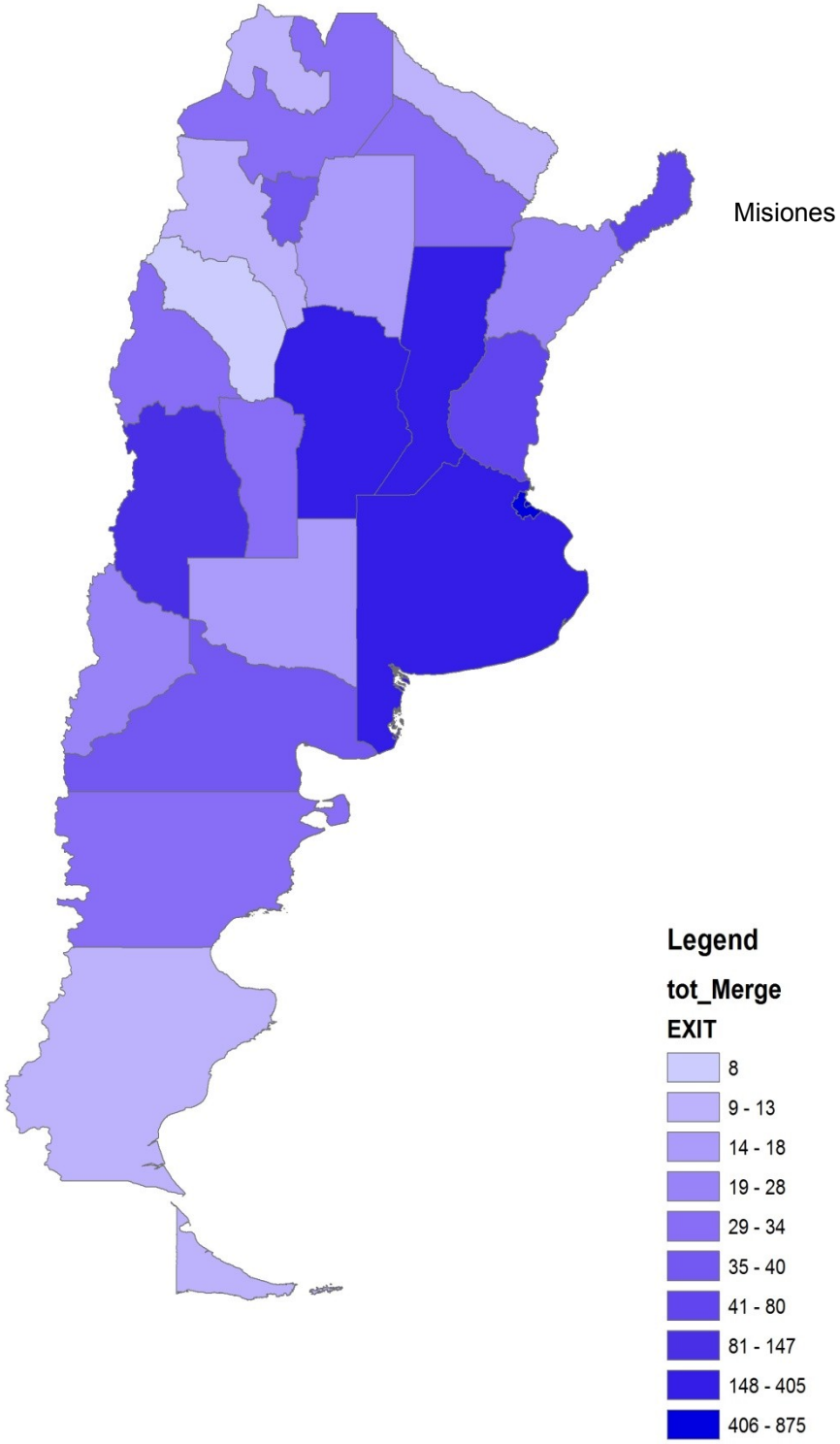

Figure 1. Number of exits by province (2003-2008 mean)

Source: authors from EBDO data. "GBA" stands for Gran Buenos Aires and "Bs As Rest" for the rest of the Buenos Aires province.

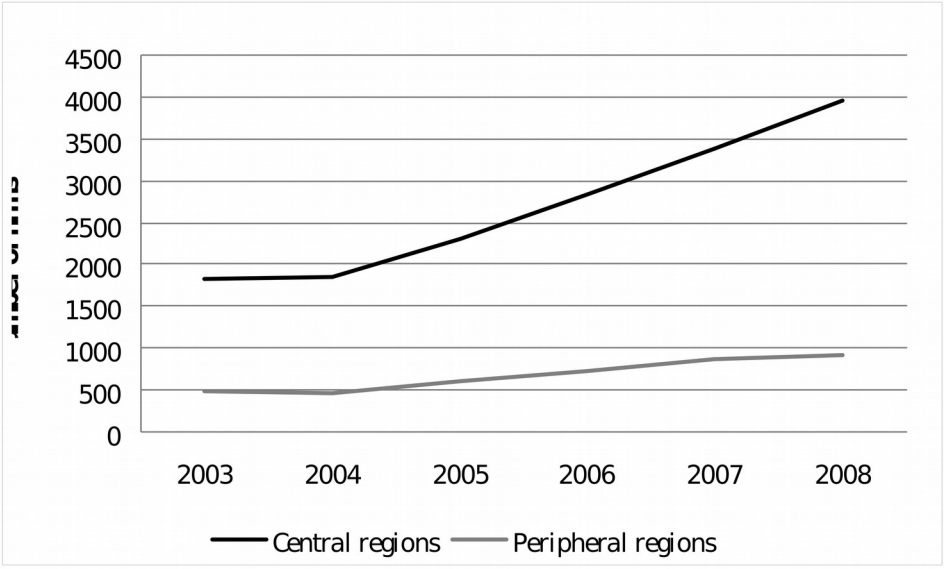

Figure 2. Number of exits in central and peripheral regions (2003-2008)

Source: authors from EBDO data. Central regions include: Capital Federal city, Gran Buenos Aires, the rest of the Buenos Aires province, Córdoba and Santa Fe. Peripheral regions include: Catamarca, Chaco, Chubut, Corrientes, Entre Ríos, Formosa, Jujuy, La Pampa, La Rioja, Mendoza, Misiones, Neuquén, Río Negro, Salta, San Juan San Luis, Santa Cruz, Santiago del Estero, Tierra del Fuego and Tucumán.

Table 2. Explanatory variables: definition, sources, expected signs and descriptive statistics

Variable	Definition	Source	Expected sign	Mean	St. Dev.	Min.	Max
Employment variation	Rate of variation in employment in all formal firms	Own calculations from EBDO	-	9.22	5.20	-6.97	22.75
Wages	Average monthly wage of private registered workers in manufacturing		+	1,891.40	864.87	676.17	5.414.11
Unemployment rate	Unemployment rate	Own calculations from National Household Survey*	+, -	8.19	3.81	1.01	18.20
$Entry_{t-2}$	Number of entries in the previous year (2 lags)	Own calculations from EBDO	+	190.85	342.43	3.00	1,609.00
$Entry_{t-1}$	Number of entries in the previous year (1 lag)		+	212.04	368.99	3.00	1,609.00
HH Index	Hirschman-Herfindahl Index		+	24.36	12.00	8.06	62.90
Industrial tradition	Incumbent firms 7 years ago (3-years moving average)		-	1,916.31	3,396.97	91.00	14,550.00
Density	ln(Population/Area) (in thousands)	Own calculations from Military Geographical Institute and INDEC	+,-	2.63	2.06	-0.18	9.53
$Density^2$	$Density^2$		+	11.14	20.38	0.01	90.78
Incumbents	Number of incumbent firms in the current year	Own calculations from EBDO	+	1,999.11	3,472.29	88.00	15,107.00
Informal Economy	Non registered workers over registered workers	Own calculations from National Household Survey*	+, -	0.81	0.31	0.16	1.51

* Data refer to 3rd quarter of every year, except for 2007 (4th quarter).

Source: authors

Table 3. Determinants of firm exit

	[1]	[2]	[3]	[4]
Employment variation	-0.0073	-0.0053	-0.0081	-0.0073
	(0.0048)	(0.0049)	(0.0057)	(0.0057)
Wages	0.0002***	0.0002*	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Unemployment rate	-0.0080	-0.0058	-0.0310**	-0.0279*
	(0.0081)	(0.0082)	(0.0150)	(0.0152)
Entry $_{t-2}$	0.0001	0.0001	0.0028**	0.0028**
	(0.0001)	(0.0001)	(0.0012)	(0.0012)
Entry $_{t-1}$	0.0001	0.0001	0.0039***	0.0039***
	(0.0002)	(0.0002)	(0.0013)	(0.0013)
HH Index	-0.0002	0.0049	-0.0084	-0.0047
	(0.0092)	(0.0094)	(0.0154)	(0.0155)
Industrial Tradition	-0.0000	-0.0000	-0.0015*	-0.0018**
	(0.0001)	(0.0001)	(0.0008)	(0.0008)
Density	-3.9590	-3.5190	-5.7524*	-7.2910**
	(2.4706)	(2.4777)	(3.4532)	(3.5629)
Density^2	0.5278**	0.6170***	1.4321***	1.6811***
	(0.2106)	(0.2131)	(0.4572)	(0.4758)
Incumbents	-0.0002	-0.0002	-0.0043***	-0.0046***
	(0.0002)	(0.0002)	(0.0012)	(0.0012)
Informal Economy		-1.1788**	-1.0399**	-1.6164**
		(0.4645)	(0.5104)	(0.7036)
Informal Economy^2		0.6774***	0.8469***	1.1888***
		(0.2381)	(0.2545)	(0.3304)
Employment variation × Centre			0.0062	0.0030
			(0.0122)	(0.0124)
Wages × Centre			0.0002	0.0001
			(0.0002)	(0.0002)
Unemployment rate × Centre			0.0315*	0.0230
			(0.0189)	(0.0194)
Entry $_{t-2}$ × Centre			-0.0026**	-0.0035***
			(0.0012)	(0.0013)
Entry $_{t-1}$ × Centre			-0.0035***	-0.0026**
			(0.0013)	(0.0012)
HH Index × Centre			-0.0948**	-0.0283
			(0.0456)	(0.0613)
Industrial Tradition × Centre			0.0015*	0.0017**
			(0.0008)	(0.0008)
Density × Centre			-4.8424	0.9861
			(10.1453)	(10.5126)
Density^2 × Centre			-0.1779	-0.8311
			(0.7013)	(0.7696)
Incumbents × Centre			0.0039***	0.0041***
			(0.0012)	(0.0012)
Informal Economy × Centre				1.5760
				(1.0540)
Informal Economy^2 × Centre				-1.1534*
				(0.5886)
AIC	773.06	768.69	767.27	766.95
LR Test of Joint Significance	1797.82***	1805.78***	1827.64***	1829.63***
Hausman	16.24*	36.99***	51.22***	42.01***
Pearson'GoF Test	108.19	99.87	78.47	74.35

Note: Poisson Fixed Effects estimates are reported. Standard errors in brackets. Asterisks indicate the statistical significance of the coefficient: *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1. Year dummy variables are included in all the specifications.

1 Notice that the factors driving the dynamics of firms (entry and exit) are not necessarily the same and/or have the same impact in developed and developing countries (see e.g. Calá *et al.*, 2014 for evidence on the entry process). In particular, the exit process in developing countries may be distinctively affected by macroeconomic instability (Stiglitz, 1998; Ocampo *et al*., 2009; Bértola and Ocampo, 2012), the size of the informal sector (Schneider, 2005) and structural regional heterogeneity (Sunkel, 1978; Cassiolato *et al.*, 2009).

2 A number of studies also use firm level data: e.g. Frazer (2005) for Ghana, Eslava *et al.* (2006) for Colombia, and López (2006), Alvarez and Görg (2009) and Alvarez and Vergara (2010; 2013) for Chile.

3 Previous studies of firm exit in Argentina are merely descriptive (Bartelsman *et al.*, 2004; MTEySS, 2007; Katz and Bernat, 2011; Calá and Rotondo, 2012). Of these, Calá and Rotondo (2012) is the only one that adopts a regional approach.

4 We use the terms "region" and "area" to refer to any geographical unit within a country. They are therefore not necessarily linked to administrative units (e.g., regions, provinces, etc.). However, most of the studies considered in this section use NUTS-II levels (i.e., regional level) and only a few smaller units (e.g., counties, as in the case of Love, 1996).

5 This "structural heterogeneity" has accentuated in recent years: while there are now many more "world-class" firms in developing countries, there is also a growing proportion of employment concentrated in low-productivity informal-sector activities (ECLAC, 2002).

6 See e.g. Calá *et al.* (2014) for details on the construction of this data set and the limitations involved in using the NHS data.

7 The cross-sectional correlation between these explanatory variables was generally low, except for the density and its square, lagged entries, and incumbents and the industrial tradition, which showed values above 0.9. It is however hard to assess the potential impact of these correlations in non-linear models. Still, the robustness exercises we performed (see below) suggest that these correlations are not a major concern here.

8 The coefficient estimates in Table 3 can be interpreted as semi-elasticities. We do not report marginal effects because of the difficulties in integrating out the unobserved heterogeneity in non-linear models (Cameron and Trivedi, 2009).

9 We also run separate regressions for the central and periphery regions and, as expected, obtained coefficient estimates very close to those reported in Table 3. In particular, we obtained essentially the same results with respect to the periphery regions. In the central regions, however, none of the coefficient estimates turned out to be statistically significant (probably due to the small degrees of freedom implied by this specification).