Regional Determinants of Exit across Firms' Size: Evidence from a Developing Country[G]

Carla Daniela Calá (♠): dacala@mdp.edu.ar
Miguel Manjón-Antolín (♣): miguel.manjon@urv.cat
Josep-Maria Arauzo-Carod (♣,♦): josepmaria.arauzo@urv.cat

Abstract

We analyse the determinants of exit in a developing country using Argentina as an illustrative case. We focus on regional determinants but estimate panel count data models for firms of different size, thus indirectly controlling for a major firm-level determinant. We find that most of the determinants used in previous studies analysing developed countries are also relevant here. The fit of the model improves, however, when variables that proxy for the specificities of developing economies are considered. We also find that while the exit of micro-small firms seem to be mostly driven by factors that are commonly found in developed countries, large firms are more influenced by factors that are typically not considered in developed countries' studies. These results raise doubts about the usefulness of public policies based on evidence from developed countries and show the importance of a differentiated analysis across firm size.

Key words: Argentina, count data models, firm exit, firm size

JEL: R12; R30; C33

(♠) Facultad de Ciencias Económicas y Sociales (Universidad Nacional de Mar del Plata)
Funes 3250; 7600 - Mar del Plata (Argentina)
Phone: + 54 223 474 9696 int. 338. Fax + 54 223 474 9696

(♣) CREIP and Quantitative Urban and Regional Economics (QURE)
Department of Economics (Universitat Rovira i Virgili)
Av. Universitat, 1; 43204 – Reus (Catalonia, Spain)
Phone: + 34 977 758 902. Fax + 34 977 759 810

(♦) Institut d'Economia de Barcelona (IEB)
Av. Diagonal, 690; 08034 – Barcelona (Catalonia, Spain)

[*] This paper was partially supported by ECO2013-42310-R N, the "Xarxa de Referència d'R+D+I en Economia i Polítiques Públiques" and the SGR programme (2014-SGR-299) of the Catalan Government. We also thank the Employment and Business Dynamics Observatory from The Ministry of Labour, Employment and Social Security from Argentina for kindly providing the dataset. Research assistance by Magda Lleixà and Elisenda Jové is greatly acknowledged. We also thank O. Martínez for useful comments. Usual caveats apply.

1. Introduction

There is a vast body of research on firm exit (Dunne *et al*. 2005). However, empirical evidence comes primarily from Western Europe and North America.[1] The determinants of firm exit in developing countries, on the other hand, have been barely studied (Naudé, 2010 and 2011). Notably, we are not aware of any study on the regional determinants of exit in developing countries. This makes difficult to design appropriate policies for developing countries (Gollin, 2008), for it is not clear that firm exit determinants are the same and/or have the same impact in developing than in developed countries.[2] Also, this lack of evidence may lead to an understating of the critical role that firm dynamics may play in these economies by increasing regional job growth and/or structural transformation (Audretsch *et al*., 2006; Ghani *et al*., 2011; Gries and Naudé, 2010).

Previous empirical studies analysing exit in developing countries include Lay (2003) for Taiwan, Frazer (2005) for Ghana, Eslava *et al.* (2006) for Colombia, López (2006), Loening *et al*. (2008) for Ethiopia, Alvarez and Görg (2009) and Alvarez and Vergara (2010; 2013) for Chile, and Ozturk and Kilic (2012) for Turkey. Notice, however, that these studies focus on either the sectorial (e.g., Lay 2003 and Ozturk and Kilic 2012) or firm (e.g., Frazer, 2005; Eslava *et al*., 2006; López, 2006; Loening *et al*., 2008; Alvarez and Görg, 2009; and Alvarez and Vergara, 2010 and 2013) determinants of exit. The impact of territorial factors on firm exit, on the other hand, has been typically neglected (see, however, Loening *et al*., 2008). This contrasts with evidence from developed countries that shows that close-down decisions are indeed related to the characteristics of the geographical area in which the firm operates.[3] Also, the new economic geography models (Krugman, 1991; Venables, 2005) and the endogenous growth theories (Aghion and Howitt, 1998) have both stressed the role of the spatial distribution of the economic activity in increasing development opportunities.

We aim to fill this gap in the literature by analysing the determinants of the annual number of exits in the Argentinean provinces between 2003 and 2008.[4] In particular, we consider a set of

[1] See, among others, Shapiro and Khemani (1987), Dunne *et al.* (1988), Klepper (1996), Love (1996), Manjón-Antolín (2010) and Carree *et al.* (2011). There is also an extensive literature on the determinants of firm survival (see e.g. Manjón-Antolín and Arauzo-Carod 2008 for an overview), where again we can only find a few contributions on developing countries (see e.g. Klapper and Richmond 2011 and Yang and Temple 2012; see also Nagler and Naudé 2014 for an overview).

[2] Recent evidence shows that this is not the case, for example, in the case of entry (Calá *et al.*, 2016).

[3] See e.g. Dejardin (2004) for Belgium, Carree *et al.* (2008); Santarelli *et al.* (2009) and Cainelli *et al.* (2014) for Italy, Keeble and Walker for the U.K., Arauzo-Carod *et al*. (2007) for Spain and Nyström (2007a) for Sweden.

[4] As many other developing countries (e.g., South Africa, Brazil, Russia, Mexico and Vietnam) Argentina has important regional differences in terms of wages, labour skills, growth rates and natural resources. Besides, firms and people are highly concentrated around the main cities and, specially, the capital.

explanatory variables that are generally found to be statistically significant in regional exit studies using data from developed countries (e.g., demand, density and industrial structure). However, we also consider variables that, while potentially important in developing countries, are usually not considered by studies on developed countries (e.g. the size of the informal economy and the extent of poverty). Results indicate that although most of the determinants used in previous studies analysing developed countries are also relevant here, variables that proxy for the specificities of developing economies do contribute to the likelihood of exit. This suggests that policy makers in developing countries should be careful about taking evidence coming from developed countries at face value.

As in any other geographically aggregated analysis, our results relate to the "average (representative) firm" in the geographical unit. This means that we can say little about why or how a specific firm exited (admittedly, a major limitation of our data and approach), but we can say a lot about how the characteristics of the geographical units in which the firms were located affect the average number of firms that exited in a certain period. It is also interesting to note that although we focus on the regional determinants of firm exit, we provide results for firms of different size (Lieberman, 1990; Manjón-Antolín, 2010).[5] By conditioning on firm size, we are thus indirectly controlling for one of the principal determinants of exit at the firm level.[6]

In particular, our data sources distinguish four groups of exiting firms depending on their number of employees: micro firms (1 to 5 employees), small firms (6 to 25 employees), medium firms (26 to 100 employees) and large firms (more than 100 employees). Estimates do not support the assumption of homogeneity across firms of different size, for the model that fits better the exit of micro and small firms differs from that of medium and large firms. Moreover, the exit of micro and small firms is essentially determined by the level of wages, the unemployment rate, and the agglomeration economies. Medium and, particularly, large firms, on the other hand, are much less affected by these factors. Thus, by showing the relevance of a differentiated analysis across firm size, these results add another layer of complexity to the design of economic policies. Not only seems important for policy makers to be careful about the specificities of developing countries, but also about the differences in the size of the exiting concerns (Li and Rama, 2015).

Finally, its vast territory is organised in large administrative units. Thus, although our results may not be generalised to all developing countries, they are likely to hold for a number of them.

[5] There has been a number of papers following an analogous strategy to analyse entry— see e.g. Acs and Audretsch (1989) and Audretsch and Elston (2002). To our knowledge, however, only Manjón-Antolín (2010) analyses exit.

[6] Age is the other major determinant of exit at the firm level —see e.g. Disney *et al*. (2003), Wagner (2009), Carreira and Teixeira (2011), Huiban (2011), Ferragina *et al*. (2012) and Yang and Temple (2012). Unfortunately, this information is not available from our statistical sources.

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

2. Literature review

Firm exit determinants can be roughly grouped into "internal" and "external" factors. Internal factors include characteristics of the organization (such as e.g. age and size), whereas external factors include both characteristics of the industry in which the firm operates (such as e.g. competition and wages) and characteristics of the spatial area where the firm is located (such as e.g. density and the industrial diversity). [7]

It is important to stress, however, that this categorisation emerges essentially from empirical (data driven) studies and is only used here for descriptive purposes. In practice, these factors are not necessarily mutually exclusive (see e.g. Nagler and Naudé, 2014). There may be interactions between internal (e.g., larger firms tend to be older) and external factors (e.g., industries tend to cluster in certain areas), as well as within internal and external factors (compared to large firms, for example, the exit of small firms may be more dependent of spatial factors). Bearing this caveat in mind, next we use this categorisation to review the principal determinants of firm exit.[8]

2.1 Internal factors

Age and size are the most widely studied determinants of firm exit.[9] In particular, it is generally found that new and small firms are more likely to exit.[10] These effects are known in the literature as the "liability of newness" (Stinchcombe, 1965) and the "liability of smallness" (Aldrich and Auster, 1986), respectively.

[7] In this paper we use the terms "space" and "region" to refer to any geographical division that is smaller than countries. Such divisions are not necessarily linked to administrative units (e.g., regions, provinces, etc.), although most of the studies considered in this section analyse NUTS-II levels (i.e., regional level) and only a few smaller units (e.g., counties, as Love, 1996).

[8] In practice, however, there are very few studies considering both internal and external factors (probably due to the difficulties in collecting appropriate data). To our knowledge, these include Disney *et al*. (2003), Loening *et al.* (2008), Wagner (2009), Carreira and Teixeira (2011), Huiban (2011), Ferragina *et al*. (2012) and Yang and Temple (2012). It is also interesting to note that these studies tend to concentrate on age and size among the internal factors and on industry characteristics among the external ones (firm's productivity is also considered by Wagner (2009), Carreira and Teixeira (2011) and Ferragina *et al*. (2012), whereas Loening *et al*. 2008 and Huiban (2011) consider regional factors by means of a dummy distinguishing urban and rural areas).

[9] Jovanovic (1982) model of "passive learning", for example, provides theoretical support for this interest.

[10] This is not necessarily the case, however, if the firm owns multiple plants and/or is part of a holding company (Disney *et al*., 2003).

The "liability of newness" refers to the fact that young firms face higher hazard rates than mature firms. However, this liability may not be linear and depends on industry characteristics (Mahmood, 2000) and/or the product cycle (Agarwal *et al.*, 2002; Agarwal and Gort, 2002). Also, although the vast majority of studies find that younger firms exit more (see, among others, Freeman *et al.*, 1983; Geroski, 1992; Mata and Portugal, 1994, 1999; Audretsch and Mahmood, 1995; Honjo, 2000; Box, 2008), some question the validity of this finding (Wagner, 1994; Audretsch *et al.*, 1999a, 1999b). As for the "liability of smallness", it refers to the fact that small firms may have some 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; Klapper and Richmond, 2011).

In addition, one has to take into account that many firms exit only a few years after creation, a phenomenon described as the "revolving door" (Audretsch, 1995). This high turnover rate of the new entrants affects mainly to the smaller ones ("conical revolving door") and has been empirically documented both at the industry and regional levels (Arauzo-Carod *et al.*, 2007; Manjón-Antolín, 2010). Further, the displacement or exit of firms associated with new entries typically requires of an adjustment period (Johnson and Parker, 1994; Carree *et al.*, 2011).

Lastly, while there is substantial evidence to show that age and size are critical variables to determine whether firms remain active (both in developed and developing countries), other characteristics of the organization (related for example to its labour force) have not received the same amount of attention. This is also the case for the entrepreneur's characteristics, which have comparatively been much less studied (Wennberg and DeTienne, 2014).

2.2 External factors

The standard approach in the theoretical analysis of firm exit is that this occurs when the (expected) profit falls below some threshold (Jovanovic, 1982; Ghemawat and Nalebuff, 1985; Klepper, 1996; Das and Das, 1996). Thus, we expect 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 will be the number of exits, since more firms are expected to cover their costs and realize profits. In particular, low growth rates in the industry cause the exit of mostly newer and smaller firms (Audretsch, 1995). We also expect exits to increase during economic downturns, although the impact may be weaker for large firms, due to the intention of recovering sunk costs (Audretsch and Mahmood, 1995; see, however, Boeri and Bellman, 1995). Lastly, the exit threshold depends on the extent of exit barriers, i.e., the costs that a firm has to bear after exiting the market (such as e.g. those related to advertising and R+D

investments). For a given proportion of loss firms, exit rates are negatively related to the ratio of sunk to variable costs (Caves and Porter, 1976; Mac Donald, 1986; Frank, 1988).

There are also important variations in the regional exit patterns (Baldwin *et al*., 2000). These are mainly explained by differences in the industrial composition (Nyström, 2006) and the labour markets (Santarelli *et al*., 2009) of the region. 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, although the opposite phenomenon is also possible if specialisation increases firms' efficiency (Reynolds *et al*., 1994). 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, an increase in unemployment may have a positive impact on exit because it is a proxy for the level of economic activity (Buzzelli, 2005; Brixy and Grotz, 2007; Fertala, 2008).

The spatial concentration of economic activities and individuals is another important determinant of exit. Since firms need to be close to other firms and workers to benefit from agglomeration economies, and market oriented firms benefit from the physical proximity to consumers, non-concentrated and isolated areas will tend to have more exits (Keeble and Walker, 1994; Littunen *et al*., 1998). However, disagglomeration economies may increase the production costs and lead to further exit. This is because higher densities entail stronger competition for scare resources, which pushes up input prices and eventually expels firms out of markets (Agarwal and Gort, 1996; Huisman and van Wissen, 2004; Fritsch *et al*., 2006).[11]

2.4 Firm exit in developing countries

While there is an extensive empirical literature on regional firm exit in developed countries (see e.g. Dunne *et al*., 2005), analogous studies on developing countries are scarce. To our knowledge, these include Lay (2003) and Ozturk and Kilic (2012), who analyse the determinants of sectorial exit in Taiwan and Turkey, respectively, 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, and the work of Loening *et al*. (2008), who additionally consider the role of the urban/rural location

[11] In this respect, Carree *et al.* (2011) show that industrial districts can potentially prevent exits, particularly of the smaller firms, which are more dependent on external resources than larger corporations (Staber, 2001).

and the distances to roads and markets. Thus, there seems to be no previous empirical study on the determinants of regional firm exit in developing countries.

It is also interesting to note 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. In our empirical analysis we consequently start with a set of explanatory variables that are meant to replicate those typically used in studies on developed economies (e.g., unemployment and agglomeration economies). However, we argue that there are factors that, while potentially important in developing countries, are generally not considered by studies on developed countries (e.g., informal economy, poverty, etc.). We then add these factors to our vector of explanatory variables and analyse whether they contribute to the likelihood of exit.

In particular, we argue that macroeconomic factors can have a different impact on exit in developing and developed countries. This is because developing economies are generally characterised by macroeconomic instability and intense cyclical variations (Stiglitz, 1998; Ocampo *et al*., 2009; Bértola and Ocampo, 2012), which makes them highly vulnerable to external (and internal) shocks. 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 will exit), thus producing a "revolving door" phenomenon that is likely to be more intense than in developed countries because the economic activity is concentrated in less capital-intensive activities and smaller establishments. Moreover, the fact that economic cycles are more pronounced in developing countries reinforces the anticyclicality of exits. Lastly, worse credit conditions in developing countries (the financial system and the access to credits are more limited) make that high real interest rates discourage firm exit less than in developed countries, particularly for small firms (Kendall *et al.*, 2010).

3. The data

3.1 Exit

Data on firms' exit 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. 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.

Data is available for the 23 Argentinean provinces and the Capital Federal city. Also, the Buenos Aires Province is actually divided into Gran Buenos Aires and the rest of the province. These are our units of observation. However, we 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.

To construct our dependent variables, we use information on the number of annual exits in each of these 24 jurisdictions 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.

Furthermore, the EBDO provides this information by groups of firms according to their size. In particular, firms are grouped depending on their total labour force in the previous year. Following the EBDO classification, we may distinguish between micro firms (1 to 5 employees), small firms (6 to 25 employees), medium firms (26 to 100 employees) and large firms (more than 100 employees). Thus, our dependent variables are the number of annual exits in each jurisdiction between 2003 and 2008 for each firm size group. Figure 1 shows the evolution of these variables over the period of analysis, for the whole Argentina and for each group of firms.

[INSERT FIGURE 1 HERE]

We first notice that after an initial period of stability (2003-2004), aggregate exits show an increasing linear growth path. According to the MTEySS (2007), this path follows from the deep economic recession of 2000-2001 and the large amount of new ventures that followed (deferred projects as well as strictly new ventures encouraged by better macroeconomic conditions). Notice also that this pattern is largely driven by the behaviour of the micro (and medium-sized) firms, which represent practically 90% of the exiting manufacturing (formal)

firms.[12] The exit of small and large firms, on the other hand, showed a slightly different evolution over this period: small firms dropped in 2004 and followed a more concave path since after, whereas large firms dropped in 2007 to increase again in 2008.

[INSERT FIGURE 2 HERE]

Next we analyse the geographical distribution of the exits-to-incumbents rate (in quartiles) using the mean values of the period 2003-2008. Figure 2 shows that exits are not randomly distributed across Argentinean provinces. Rather, they concentrate in peripheral regions (possibly because of weaker business opportunities at the fringe) and in the capital of the country (possibly because of the strong competition). However, we tested for the existence of spatial correlation in the number of entries using a contiguity spatial neighbour matrix (i.e., two provinces are neighbours only if they share a common border) and found no evidence of spatial correlation in the data.

3.2 Explanatory variables

We resort to three statistical sources to construct our vector of explanatory variables: the Military Geographical Institute (although this was only used to obtain the size of the provinces in km^2), the EBDO and the National Household Survey (NHS). In particular, the variables constructed from the information contained in the EBDO database refer to the whole province, whereas the variables constructed from the information contained in the NHS refer to 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).[13]

These sources allowed us to construct proxies for the evolution of the economic activity, the labour market, the industrial structure, the spatial concentration of economic activity and the entry rates. As discussed in the previous section, these are factors widely used in developed countries studies. However, we were also able to construct variables usually not included in developed countries' studies, such as the level of poverty, the informal economy and the rate of private/public employment. These variables are meant to capture the economic and structural singularities of a developing country (Calá *et al.*, 2016).

[12] Incumbent firms show an analogous size distribution, since 88.6% are micro firms, 9.5% are small firms, 1.5% are medium-size firms and 0.3% are large firms. (These figures correspond to the average of the period 2003 to 2008).
[13] See Calá *et al.* (2016) for details on the construction of these variables.

Next we analyse each of these explanatory variables in detail. In particular, we review the arguments and extant evidence on their use with the aim of constructing hypotheses about the expected sign of the associated coefficients. Table 1 reports the definition, statistical sources and descriptive statistics of these explanatory variables.

[INSERT TABLE 1 HERE]

Business cycle. We use the rate of variation of the unemployment rate to proxy for the evolution of the economic activity. The coefficient of this variable is expected to be positive, thus reflecting the anticyclicality of exits. In particular, the magnitude of the coefficient is expected to be larger for small and micro firms (Audretsch, 1995).

Labour market. We use wages and the unemployment rate to asses the labour market impact on firm exit. Wages correspond to the average monthly wage of private registered workers (in nominal terms because official inflation rates in Argentina are not reliable since 2007). We expect a positive sign for this variable and no significant differences across firms' size. As for the unemployment rate, a negative impact is expected if higher rates reduce firms' labour costs (especially for small firms, which are in principle more labour intensive) and/or if the owners of (micro) firms are less prone to exit in the face of fewer job opportunities ("supply effect"). However, a positive effect is also possible as less economic activity tends to turn into closed-downs ("demand effect"). Thus, the overall impact will depend on which effect dominates.

Industrial structure. The industrial structure of the province is approximated using the Hirschman-Herfindahl Index. This variable measures the lack of industrial diversity in each province and is expected to impact positively on exit (Guesnier, 1994; Reynolds *et al*., 1994), regardless of firms' size.

Spatial concentration. Population density and its square have been widely used as proxies for agglomeration and disagglomeration economies, respectively (Carree *et al*., 2011; Davidsson *et al*., 1994; Tamásy and Le Heron, 2008). If firms benefit from agglomeration economies and/or from the proximity to consumers, then a negative sign for the density coefficient and a positive sign for its squared are expected (Nyström, 2007a). However, the opposite signs may be found, i.e. a positive sign for density and a negative one for its square, because firms in more dense areas also face stronger competition (Keeble and Walker, 1994). In any case, the effects of these variables are expected to be larger for the smaller firms, since they are more sensitive to the impact of external economies (Duranton and Puga, 2001).

Entries. We use the (lagged) number of entries in order to account for the interdependence between entries and exits. We expect this variable to show a positive effect, particularly in SMEs (Audretsch, 1995; Carree *et al*., 2011: see, however, Johnson and Parker, 1994).

Private/Public. We expect that exits will be higher in jurisdictions with a higher ratio of private-to-public employees. The reason for this is that competition will be stronger in regions where private activities are more important in relative terms. In particular, we expect that this competition effect will be stronger for smaller firms as they serve primarily these local markets.

Poverty. The poverty level is proxied by the percentage of households below the indigence line, that is, the share of households that cannot afford a basic food basket (about 38 USD per adult in 2003). As firms are more likely to exit in low income markets, we expect a negative coefficient for this variable.

Informal economy. We use the ratio of non-registered workers to total workers as a proxy for the regional productive structure (e.g., in terms of seasonality) and/or the lack of government controls over informal economy. The impact of this variable on exit is ambiguous: a positive/negative sign may arise depending on whether more informality implies more/less competition for the formal activities (recall that we only consider the exit of formal firms) and/or less/more likelihood of informal hiring. Also, we expect SMEs to be more affected by these effects, since their average size makes them closer competitors to the informal firms and/or more likely to contract resources informally.

At this point it is important to stress that, with the exception of the size of the exiting firm, our data sources do not provide information about the internal factors discussed in Section 2.1. Notice also that, since our unit of analysis is geographical and our dependent variables are counts of exits, we cannot just include the size of the existing firms among the explanatory variables. We thus account for firm size by estimating the effects of the external factors we consider for firms of different size (micro, small, medium and large firms, defined as described above). That is, we analyse whether the external factors we consider affect the exit of micro and small firms much in the same way as they do to medium and large firms (Acs and Audretsch, 1989; Audretsch and Elston, 2002; Manjón-Antolín, 2010).

One may argue that such procedure may still leave aside some relevant internal factors. Notice, however, that most of the exits we observe are likely to be young firms because they consist of micro and small firms. Thus, although in an indirect way we are also somehow controlling for

the age of the firms (Fariñas and Moreno, 2000; Box, 2008). Moreover, it can be argued that in the unstable macroeconomic environment that is typical of a developing country, the bulk of exits will be mostly driven by external factors (Box, 2008).[14]

4. Econometric modelling and estimation results

We seek to empirically asses the impact of these regional determinants on exit. To this end, we rely on count data models because our dependent variables are counts of the numbers of exiting firms. In particular, panel data models were preferred to cross-section models on the grounds of two empirical tests. First, likelihood ratio tests on the variance of the individual effects always yielded statistically significant results, thus rejecting the validity of pooled estimates (Cameron and Trivedi, 2009). Second, we tested the assumption that observations are independent across the considered years 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.

In order to determine the model specification, it is interesting to note that there are no zeros in the micro-exits variable. That is, in each jurisdiction-year pair of our sample we have a strictly positive number of micro exits. This is why when analysing the determinants of this dependent variable we do not consider inflated versions of the Poisson and negative binomial models. However, small, medium and big exits show positive numbers of zeros (26, 83 and 111, respectively). This raises the question of whether it is necessary to use the inflated versions of these models to account for the "excess of zeros". However, the Vuong test of the pooled models turned out to be not conclusive (i.e., not statistically significant). We have therefore only considered the estimation of (non-inflated) Poisson and negative binomial models. Still, since the α-parameter of the negative binomial models is barely significant from zero in medium and big firms, it is not possible to compute the Vuong test for these models (and the negative binomial model collapses into the Poisson model). Therefore, for medium and big firms we only consider results from Poisson models. Lastly, we address the question of whether there is correlation between the covariates and the individual effect by computing a Durbin-Hu-Hausman test (Hausman *et al.*, 1984). Results reject the null hypothesis of no correlation between the covariates and the individual effect (see the bottom rows of Table 2), so we report coefficients estimates from the random effects estimator in Table 2. These coefficients can be interpreted as semi-elasticities (Cameron and Trivedi, 2009).

[14] Against this tenet, evidence reported by Nagler and Naudé (2014) indicates that internal factors (e.g., low profitability) are at least as important as external factors (e.g., lack of finance) to determine the exit of the enterprises owned by Uganda's households.

[INSERT TABLE 2 HERE]

We initially concentrate on the results obtained using explanatory variables that are commonly considered in studies performed using data from developed countries (reported in the odd columns of Table 2). The first thing to notice is that the exit of firms of different sizes is not driven by the same determinants. There are indeed some common factors, such wages (which encourages exit) and, to a lesser extent, density (denser areas expel firms out of the market) and the unemployment rate (i.e, the "supply effect" seems to dominate); but there are also differences, particularly in variables such as the industrial diversity and the number of entries. This is mostly apparent when comparing results from the micro and large firms, the extreme categories. More precisely, for the smaller firms differences arise in the statistical significance of the industrial diversity (that only increases the exit of SMEs), the number of entries (the revolving door effect is significant only for small firms) and the evolution of the unemployment rate (which seems to be relevant only for medium enterprises), whereas the lack of significance of the labour market characteristics, the industrial diversity and the agglomeration economies among large firms point to their weaker dependence from the local environment. Lastly, in general the sign of the coefficients is the expected (see the previous section) and does not change between size categories.

We turn now to the results obtained when including variables that proxy for the specificities of developing countries (reported in the even columns of Table 2). These variables improve the fit of the models, thus indicating that firm exit in developing countries depends on additional factors and, consequently, exit policies cannot be automatically transposed from developed countries. Rather, the design of such policies should be based on studies that take into account the specificities of the institutional setting (here reflected in the poverty level and the size of the informal economy). It is also interesting to note the differential impact shown by the large firms. First, they are the only ones that are significantly affected by the variable of poverty. Second, they are the only ones that are positively and significantly affected by the variable of informal economy (consistent with the idea that large firms are less likely to get involved in informal hiring), while small and medium exits show the opposite sign (consistent with the idea that SMEs may buy inputs to the informal sector, which enables them to low costs and/or increase flexibility).

[INSERT TABLE 3 HERE]

In order to check the robustness of our results to alternative specifications of the model, we proceed in the following way. First, we replaced the entry variable by its lag to address endogeneity concerns. We report these results in Table 3. Second, we replaced the unemployment rate by the rate of variation of the employment in all formal firms. Third, we 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. Fourth, we added the stock of firms as an additional explanatory variable (that may better capture the size of the economy). Results from these alternative specifications (not reported) show that some of the coefficients vary its value and/or statistical significance with respect to those reported in Table 2. However, as the results reported in Table 3 show, most of the conclusions extracted from Table 2 still hold.[15]

5. Conclusions

The exit of firms in developed countries has been widely investigated. In contrast, studies on the determinants of exit in developing countries are scarce. In fact, this seems to be the first study to analyse the regional determinants of exit in a developing country. Little is consequently known about what determines firm exit in developing countries and whether these determinants differ from the ones typically found in developed countries. This paper aims to (partially) fill this gap in the literature using Argentina as an illustrative case.

In particular, we estimate panel count data models of the number of exits in the Argentinean provinces during the period 2003 to 2008. We find that most of the determinants used in previous studies analysing developed countries are also relevant here. However, we also find that the some of the variables we use to proxy for the specificities of developing economies are statistically significant. This raises doubts about the usefulness of public policies based on empirical evidence coming basically from developed countries. In other words, there is a potential risk of failure in "rubber-stamp" policies that simply follow recipes that work well in developed countries.

We also analyse whether the determinants of exit we consider affect micro and small firms much in the same way as they do to medium and large firms. We find that the covariates and model specification that fit better the exit of micro(-small) firms differ from those of (medium-) large firms. It seems therefore that the analysis of exit in developing countries requires to

[15] We also explored the inclusion of year dummies among the set of regressors. Again, our results barely changed, perhaps with the exception of the square of density and the informality measure, which for the smaller firms became non-significant. In particular, year dummies were not statistically significant for the larger firms and for the smaller ones only the year 2004 showed a statistically significant coefficient.

account for both internal and external factors. Otherwise, inferences can be misleading. In particular, we find that the size of the informal economy affects differently small (negatively) and large (positively) firms. This means that, in the short run, as informality declines the size distribution of firms shifts to right (*ceteris paribus*). To the extent that this shift implies an increase in aggregate output (Li and Rama, 2015), our results support the implementation of policies aimed at discouraging informal activity. As a caveat, though, policy makers should keep in mind that "any efforts to alter the prevailing size distribution of firms should be appraised critically" because the "distortions aimed at altering the size distribution of firms may be costly, in terms of aggregate output" (Gollin, 2008: 232).

As for the future extensions of this work, they are mainly driven by the limitations of our data set and empirical strategy. First, it seems necessary to use a more disaggregated unit of observation. Given the lack of data on smaller geographical units, exploring a sectorial breakdown will not only allow us to incorporate industry-specific variables but to reduce the degree of heterogeneity. Second, it seems necessary to incorporate internal factors in a more direct way. Since this data is not available from official statistics, this will require the design and implementation of a survey. Third, it may be interesting to explore the dynamics of exit through the analysis of its degree of persistence over time. Since our model is non-linear, addressing the endogeneity problem caused by the inclusion of a lagged dependent variable will require an alternative econometric framework (derived, for example, from moment conditions rather than likelihood).

References

Acs, Z. J., & Audretsch, D. B. (1989): "Small-firm entry in US manufacturing", *Economica*, **56 (2)**: 255-265.

Agarwal, R. and Gort, M. (2002): "Technological change. Firm and product life cycle and firm survival", *American Economic Review* **92**: 184-190.

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

Agarwal, R.; Sarkar, M.B. and Echambadi, R. (2002): "The conditioning effect of time on firm survival: An industry life cycle approach", *Academy of Management Journal* **45 (5)**: 971-994.

Aghion, P. and Howitt, P. (1998): *Endogenous Growth Theory*. MIT Press. Cambridge, Massachusetts. London, England.

Aldrich, H. and Auster, E.R. (1986): "Even dwarfs started small: liabilities of age and size and their strategic implications", *Research in Organizational Behavior* **8**: 165–198.

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

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

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

Arauzo-Carod, J. M., Manjón-Antolín, M., Martín, M., and 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. and Mahmood, T. (1995): "New Firms Survival: New Results Using a Hazard Function", *The Review of Economics and Statistics* **77 (1)**: 97–103.

Audretsch, D.B.; Santarelli, E. and Vivarelli, M. (1999a): "Start Up Size and Industrial Dynamics: Some Evidence from Italian Manufacturing", *International Journal of Industrial Organization* **17**: 965-983.

Audretsch, D.B.; Santarelli, E. and Vivarelli, M. (1999b): "Does the Startup Size Influence the Likelihood of Survival?". In D.B. Audretsch and R. Thurik (eds.), *Innovation, Industry Evolution, and Employment*, Cambridge: Cambridge University Press, pp. 280–296.

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

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

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

Boeri, T. and 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.

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

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.

Cainelli, G.; Montresor, S. and Marzetti, G.V. (2014): "Spatial agglomeration and firm exit: a spatial dynamic analysis for Italian provinces", *Small business economics*, **43 (1)**, 213-228.

Calá, C.D.; Manjón-Antolín, M. and Arauzo-Carod, J.M. (2016): "Regional Determinants of Firm Entry in a Developing Country", *Papers in Regional Science*, **95 (2)**: 259-279.

Cameron, A.C. and Trivedi, P.K (2009): *Microeconometrics Using Stata*, Stata Press. College Station, Texas.

Carree, M.; Verheul, I. and Santarelli, S. (2011) Sectoral patterns of firm exit in Italian provinces. *Journal of Evolutionary Economics* **21**: 499–517.

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

Carree, M.A.; Verheul, I. and Santarelli, E. (2011): "Sectoral patterns of firm exit in Italian provinces", *Journal of Evolutionary Economics* **21**: 499-517.

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

Caves, R. and 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. and 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.

Dejardin, M. (2004): "Sectoral and cross-sectoral effects of retailing firm demographies", *Annals of Regional Science* **38**: 311-334.

Davidsson, P., Lindmark, L. and Olofsson, C.H. (1994): "New firm formation and regional development in Sweden", *Regional Studies* **28 (4):** 395-410.

Disney, R.; Haskel, J. and Heden, Y. (2003): "Entry, exit and establishment survival in UK manufacturing", *The Journal of Industrial Economics* **51 (1)**: 91-112.

Dunne, T.; Klimek, S.D. and Roberts, M.J. (2005): "Exit from regional manufacturing markets: The role of entrant experience", *International Journal of Industrial Organization* **23 (5-6)**: 399-421.

Dunne, T.; Roberts, M.J. and Samuelson, L. (1988): "Patterns of firm entry and exit in U.S. manufacturing industries", *RAND Journal of Economics* **19 (4)**: 495-515.

Duranton, G. and Puga, D. (2001): "Nursery Cities: Urban Diversity, Process Innovation, and the Life Cycle of Products", *American Economic Review*, **91 (5)**: 1454-1477.

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

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

Fariñas, J. C. and Moreno, L. (2000): "Firms' growth, size and age: a nonparametric approach", *Review of Industrial Organization*, **17 (3)**, 249-265.

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. and 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.

Ferragina, A., Pittiglio, R., & Reganati, F. (2012): "Multinational status and firm exit in the Italian manufacturing and service sectors", *Structural Change and Economic Dynamics*, **23 (4)**: 363-372.

Freeman, J.; Carroll, G. and Hannan, M. T. (1983): "The liability of newness: age dependence in organisational death rates", *American Sociological Review* **48**: 692–710.

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

Ghani, E., Kerr, W. R. and O'Connell, S. (2011): *Promoting Entrepreneurship, Growth, and Job Creation*, Ghani, E. (Ed.) Ch. 7, 166-199. In: *Reshaping Tomorrow*, ed. E. Ghani. Oxford University Press, New York.

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

Gollin, D. (2008): "Nobody's business but my own: Self-employment and small enterprise in economic development", *Journal of Monetary Economics* **55**: 219-233.

Guesnier, B. (1994): "Regional variations in new firm formation in France", *Regional Studies* **28**: 347-58.

Geroski, P.A. (1992): “Entry, Exit and Structural Adjustment in European Industry”. In K. Cool, J. D. Neven and I. Walter (eds.), *European Industrial Restructuring in the 1990s*, London: Macmillan, pp. 139–161.

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

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

Honjo, Y. (2000): “Business Failure of New Firms: An Empirical Analysis Using a Multiplicative Hazards Model”, *International Journal of Industrial Organization* **18**: 557–574.

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

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

Johnson, P., Parker, S. (1994): “The interrelationships between births and deaths”, *Small Business Economics* **6**: 283–290.

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

Keeble, D. and 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. and Ponce, A. (2010): “Measuring Financial Access around the World”, Policy Research Working Paper 5253, The World Bank, March.

Klapper, L. and Richmond, C. (2011): ·Patterns of business creation, survival and growth: Evidence from Africa”, *Labour Economics* **18**: S32–S44.

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

Kosacoff, B. and Ramos, A. (1999): “The industrial policy debate”, *CEPAL Review* **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.

Li, Y., and Rama, M. (2015): "Firm Dynamics, Productivity Growth, and Job Creation in Developing Countries: The Role of Micro-and Small Enterprises", *The World Bank Research Observer*, **30(1)**, 3-38.

Lieberman, M. B. (1990): “Exit from declining industries: “shakeout” or “stakeout”?”, *RAND Journal of Economics*, **21**: 538-554.

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

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

Loening, J., Rijkers, B. and Söderbom, M. (2008): "Nonfarm Microenterprise Performance and the Investment Climate: Evidence from Rural Ethiopia", Policy Research Working Paper no. 4577. Washington DC: The World Bank.

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.

Mahmood, T. (2000): "Survival of newly founded business: a log-logistic model approach", *Small Business Economics* **14**: 223-237.

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.

Manjón-Antolín, M. C. and Arauzo-Carod, J. M. (2008): "Firm survival: methods and evidence", *Empirica*, **35**, 1-24.

Mata, J. and Portugal, P. (1999): "Technology Intensity, Demand Conditions, and the Longevity of Firms". In D.B. Audretsch and A.R. Thurik (eds.), I*nnovation, Industry Evolution and Employment*, Cambridge: Cambridge University Press, pp. 265–279.

Mata, J. and Portugal, P. (1994): "Life Duration of New Firms", *Journal of Industrial Economics* **42**: 227–246.

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.

Nadler, P. and Naudé, W. (2014): "Non-Farm Enterprises in Rural Africa: New Empirical Evidence", Policy Research Working Paper no. 7066. Washington DC: The World Bank.

Naudé, W. (2010): "Entrepreneurship, developing countries, and development economics: new approaches and insights", *Small Business Economics* **34**: 1-12.

Naudé, W. (2011): "Entrepreneurship is Not a Binding Constraint on Growth and Development in the Poorest Countries", *World Development* **39 (1)**: 33-44.

Nyström, K. (2006): *Entry and Exit in Swedish Industrial Sectors*, Jönköping International Business School, Jönköping.

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

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

Reynolds, P.; Storey, D.J. and Westhead, P. (1994): "Cross-national comparisons of the variation in new firm formation rates", *Regional Studies* **28 (4)**: 443–456.

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

Shapiro, D. and Khemani, R.S. (1987): "The determinants of entry and exit reconsidered", *International Journal of Industrial Organization* **5 (1)**: 15-26.

Staber, U. (2001): "Spatial Proximity and Firm Survival in a Declining Industrial District: The Case of Knitwear Firms in Baden-Württemberg", *Regional Studies* **35 (4)**: 329-341.

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

Stinchcombe, A.L. (1965): "Organizations and social structure". In: J.G. March (ed.), *Handbook of Organizations*. Rand McNally: Chicago, pp. 142–193.

Tamásy, C. and Le Heron, R. (2008): "The Geography of Firm Formation in New Zealand", *Tijdschrift voor Economische en Sociale Geografie* **99 (1)**: 37-52.

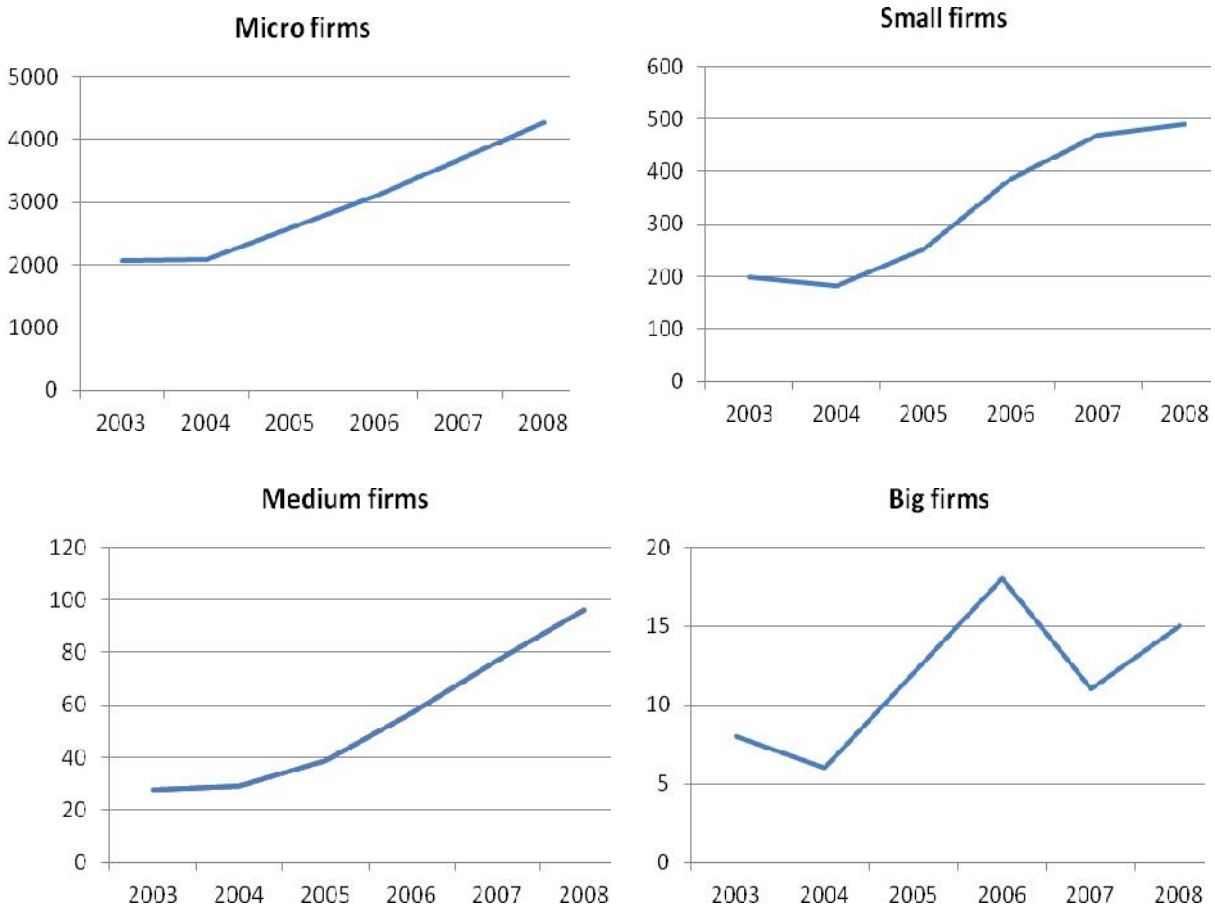
Venables, A.J. (2005): "Spatial disparities in developing countries: cities, regions, and international trade", *Journal of Economic Geography*, **5 (1)**: 3-21.

Wagner, J., (1994): "The Post-Entry Performance of New Small Firms in Manufacturing Industries", *Journal of Industrial Economics* **42 (2)**: 141–154.

Wennberg, K. and DeTienne, D.R. (2014): "What do we really mean when we talk about 'exit'? A critical review of research on entrepreneurial exit", International Small Business Journal, 32(1): 4-16.

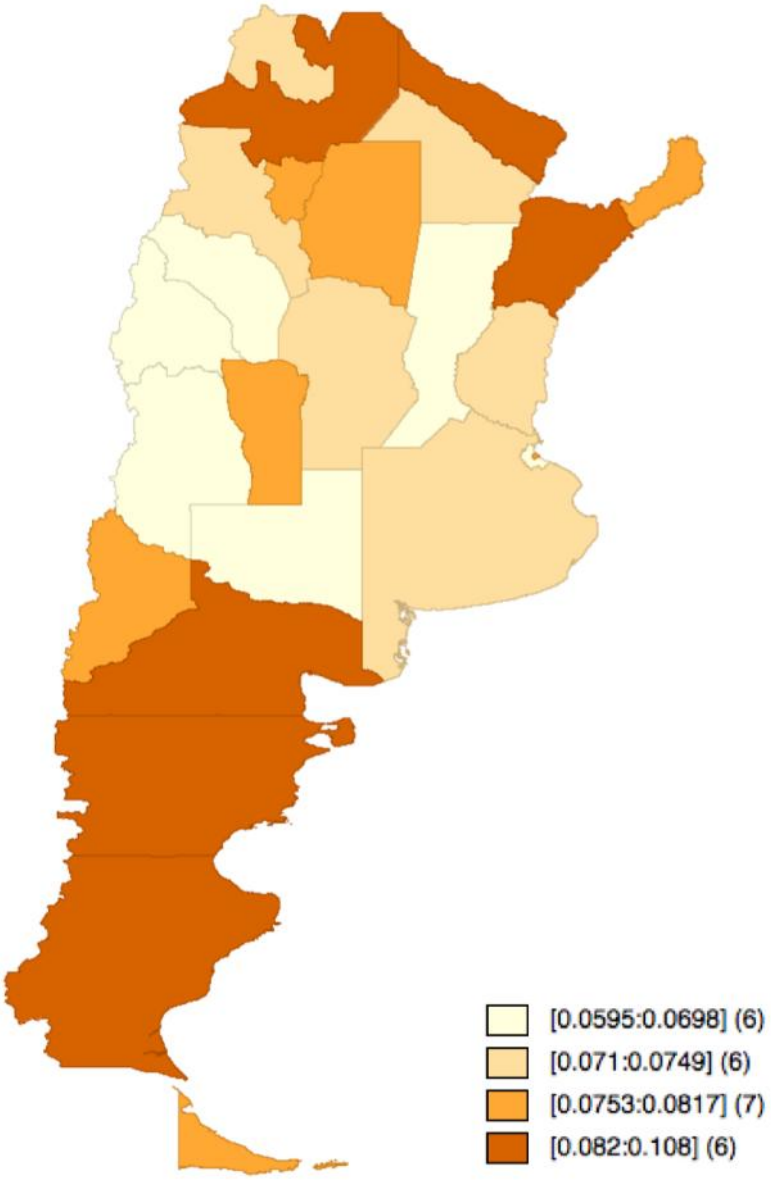
Yang, Q.G. and Temple, P. (2012): "Reform and competitive selection in China: An analysis of firm exits", *Structural Change and Economic Dynamics*, **23 (3)**: 286-299.

Figure 1. Exits by size in Argentina.



Source: own elaboration from EBDO data

Figure 2. Exit-to-incumbents rates in Argentinean provinces (2003-2008 mean).



Source: own elaboration from EBDO data. Data are grouped by quartiles.

Table 1. Explanatory variables: definition, sources, expected signs and descriptive statistics

Variable	Definition	Source	Mean	St. Dev.	Min.	Max
UNEMP. RATE	Unemployment rate	Own calculations from National Household Survey*	8,19	3,81	1,01	18,20
UNEMP. VAR	Rate of variation in unemployment rate		-10,11	27,86	-67,54	97,76
DENSITY	ln(Population/Area) (in thousands)	Own calculations from Military Geographical Institute and INDEC	676,91	2.732,61	0,83	13.739,75
$DENSITY^2$	$Density^2$		2,63	2,06	-0,18	9,52
INFORMAL ECONOMY	Non registered workers over registered workers	Own calculations from National Household Survey*	0,81	0,31	0,16	1,51
PRIVATE/PUBLIC	Private employees/Public employees		3,32	1,64	1,22	9,14
POVERTY	% of households below the indigence line		8,87	6,15	0,40	29,80
HHI	Hirschman-Herfindahl Index	Own calculations from EBDO	24,36	12,00	8,06	62,90
ENTRY (LAGGED)	Number of entries in the current (previous) year		139,92	253,52	4,00	1.347,00
WAGES	Average monthly wage of private registered workers		1.891,40	864,87	676,17	5.414,11

Source: own elaboration.

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

Table 2. Determinants of firm exit by size

Size	Micro		Small		Medium		Big		All firms	
Model	NB RE		NB RE		Poisson RE		Poisson RE		NB RE	
Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
UNEMP. VAR	0.0009	0.0003	0.0019	0.0001	0.0083***	0.0065*	-0.0010	-0.0067	0.0010*	0.0003
	(0.0006)	(0.0006)	(0.0017)	(0.0019)	(0.0029)	(0.0034)	(0.0064)	(0.0068)	(0.0006)	(0.0006)
UNEMP. RATE	-0.0316***	-0.0157*	-0.0512**	-0.0146	-0.0729*	-0.0304	0.0032	0.1070	-0.0350***	-0.0162
	(0.0073)	(0.0095)	(0.0215)	(0.0270)	(0.0396)	(0.0490)	(0.0569)	(0.0734)	(0.0080)	(0.0100)
WAGES	0.0003***	0.0002***	0.0004***	0.0003***	0.0004***	0.0001	0.0004*	0.0007**	0.0003***	0.0002***
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0003)	(0.0000)	(0.0000)
HHI	-0.0142	-0.0139	-0.0340**	-0.0309**	-0.0632***	-0.0693***	-0.0094	-0.0097	-0.0000	-0.0000
	(0.0095)	(0.0091)	(0.0151)	(0.0131)	(0.0229)	(0.0225)	(0.0232)	(0.0198)	(0.0001)	(0.0001)
ENTRY	-0.0001	-0.0001	0.0008***	0.0007**	0.0006	0.0003	0.0010*	0.0009	-0.0157	-0.0171*
	(0.0001)	(0.0001)	(0.0003)	(0.0003)	(0.0005)	(0.0005)	(0.0006)	(0.0006)	(0.0099)	(0.0093)
DENSITY	1.0827***	1.1891***	1.0966***	1.0109***	0.8910**	1.0411***	0.3843	0.4034	1.0534***	1.1587***
	(0.2644)	(0.2516)	(0.2571)	(0.2510)	(0.3479)	(0.3790)	(0.3799)	(0.5530)	(0.2584)	(0.2434)
$DENSITY^2$	-0.0653**	-0.0753***	-0.0824***	-0.0770***	-0.0597*	-0.0760**	-0.0104	-0.0060	-0.0713***	-0.0792***
	(0.0271)	(0.0252)	(0.0252)	(0.0238)	(0.0314)	(0.0335)	(0.0293)	(0.0453)	(0.0259)	(0.0243)
PRIVATE/ PUBLIC		0.0189		0.1363***		0.0595		-0.1889		0.0315*
		(0.0154)		(0.0457)		(0.0893)		(0.1434)		(0.0166)
POVERTY		-0.0041		-0.0013		-0.0134		-0.1972***		-0.0034
		(0.0065)		(0.0214)		(0.0473)		(0.0704)		(0.0068)
INFORMAL ECONOMY		-0.2928*		-0.6192		-1.9684**		3.2240***		-0.3260**
		(0.1495)		(0.4517)		(0.8936)		(1.1421)		(0.1609)
AIC	1121.96	1117.45	689.05	679.93	348.90	343.62	178.72	172.67	1158.28	1151.68
LR Test	946.90***	1140.29***	222.84***	297.93***	132.35***	147.71***	157.97***	139.75***	795.59***	1049.01***
Vuong Test			0.74	0.55	1.29	0.88	1.09	0.79		
Hausman	4.90	8.17	7.35	9.27	6.56	11.54	4.63	12.78*	8.39	11.34
α-parameter	0.32***	0.24***	0.29***	0.21***	0.23***	0.10***	0.00	0.00	0.28***	0.21***

Note: NB stands for Negative binomial, RE stands for Random effects model. Standard errors in brackets. Level of significance: *** 1%, ** 5% and * 10%. LR Test is a test of the joint significance of the explanatory variables. Observations: 144.

Table 3. Determinants of firm exit by size (robustness check)

Size	**Micro**		**Small**		**Medium**		**Big**		**All firms**	
Model	**NB RE**		**NB RE**		**Poisson RE**		**Poisson RE**		**NB RE**	
Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
UNEMP. VAR	0.0009	0.0005	0.0017	-0.0007	0.0078***	0.0060*	-0.0008	-0.0065	0.0010*	0.0004
	(0.0006)	(0.0006)	(0.0017)	(0.0019)	(0.0029)	(0.0033)	(0.0065)	(0.0069)	(0.0006)	(0.0006)
UNEMP. RATE	-0.0335***	-0.0224**	-0.0391	0.0017	-0.0137	0.0100	0.0384	0.1564**	-0.0344***	-0.0196*
	(0.0091)	(0.0113)	(0.0268)	(0.0309)	(0.0416)	(0.0491)	(0.0570)	(0.0728)	(0.0097)	(0.0118)
WAGES	0.0003***	0.0002***	0.0003***	0.0002**	0.0004**	0.0001	0.0003	0.0007**	0.0003***	0.0002***
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0003)	(0.0000)	(0.0000)
HHI	-0.0128	-0.0126	-0.0402***	-0.0370***	-0.0557***	-0.0617***	-0.0172	-0.0122	0.0000	-0.0000
	(0.0097)	(0.0092)	(0.0156)	(0.0138)	(0.0194)	(0.0207)	(0.0229)	(0.0188)	(0.0001)	(0.0001)
ENTRY (LAGGED)	-0.0000	-0.0001	0.0003	0.0001	0.0009**	0.0006	0.0006	0.0009*	-0.0156	-0.0166*
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0100)	(0.0093)
DENSITY	1.0685***	1.1927***	1.1187***	1.0961***	0.7055**	0.9458***	0.4493	0.3578	1.0507***	1.1661***
	(0.2633)	(0.2505)	(0.2752)	(0.2660)	(0.3223)	(0.3503)	(0.3948)	(0.5560)	(0.2569)	(0.2434)
$DENSITY^2$	-0.0647**	-0.0760***	-0.0809***	-0.0780***	-0.0467	-0.0689**	-0.0112	0.0008	-0.0714***	-0.0798***
	(0.0270)	(0.0251)	(0.0269)	(0.0254)	(0.0287)	(0.0310)	(0.0315)	(0.0461)	(0.0259)	(0.0242)
PRIVATE/ PUBLIC		0.0261		0.1108**		0.0091		-0.2496	0.0010*	0.0349**
		(0.0159)		(0.0490)		(0.0907)		(0.1570)		(0.0172)
POVERTY		-0.0005		-0.0211		-0.0331		-0.2142***		-0.0021
		(0.0063)		(0.0206)		(0.0463)		(0.0709)		(0.0066)
INFORMAL ECONOMY		-0.3282**		-0.4894		-1.5244*		3.4485***		-0.3379**
		(0.1480)		(0.4635)		(0.8999)		(1.1522)		(0.1597)
AIC	1122.37	1117.37	693.46	685.88	344.29	341.55	179.96	171.82	1158.29	1151.45
LR Test	932.95***	1154.30***	210.32***	268.67***	150.44***	165.29***	157.75***	138.22***	793.71***	1054.70***
Vuong Test			0.86	0.63	1.41*	0.91	1.16	0.83		
Hausman	6.75	11.57	10.83	10.50	3.78	34.63***	4.99	12.28*	10.88**	-6.34
α-parameter	0.39***	0.28***	0.42***	0.29***	0.17***	0.01	0.00	0.00	0.38***	0.28***

Note: NB stands for Negative binomial, RE stands for Random effects model. Standard errors in brackets. Level of significance: *** 1%, ** 5% and * 10%. LR Test is a test of the joint significance of the explanatory variables. Observations: 144.