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"A territorial approach to firm entry: The effect of city size"

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A territorial approach to firm entry: The effect of city size

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Abstract:

This paper concerns the effects of territorial factors on the processes involved in the creation of manufacturing firms in Spanish cities. Most contributions have focused on regional factors rather than urban ones. Here we assume that it is possible to identify certain urban factors that attract new firms. We use data for the entry of firms in Spanish manufacturing industries between 1994 and 2002. This paper contributes to the existing literature on market entry.

Key words: cities, regions, firm entry and Spanish economy
JEL: R0, R12, L60

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1. Introduction

This paper concerns the effects of territorial factors on the processes involved in the creation of manufacturing firms in Spanish cities. Our main idea is that territory is not neutral to market dynamics, so the way in which firms decide their location partly determines their future results and their survival in the market. Traditionally, analyses of firm demography have not considered territory as an explanatory element of the entry and exit of firms and have mainly focused on sectorial variables. However, several recent contributions explicitly consider the incidence of territorial factors, though most of these refer to the regional level not the local one. Here, however, we combine that approach with a more innovative one in which cities play a key role in firm entry and where entry patterns differ according to the size of the city.

In his seminal work, Orr (1974) formulates an explanatory model for firm entries based on the incentives that attract them and the barriers that discourage them, but do not consider territory as an explanatory variable. This implies that geographical space is neutral to the entry phenomenon: potential firms do not consider territorial factors but only those that are related to the activity (common to all the territories). According to this premise, entries would be distributed homogenously as economic activity is. This, however, does not match real economic activity.

As we know, space is not homogenous. This is mainly because of its physical characteristics and orographic accidents but it is also because of the characteristics of the agents located there. External economies are an example of this heterogeneity. The role of these economies as determining elements of the location of manufacturing firms has gained considerable importance in the last few years, mainly after the studies of Glaeser et al. (1992) and Henderson et al. (1995). External economies are gains in efficiency experienced by agents

in a territory as a result of the concentration of people and activities in it. Moreover, the smaller the firm, the more effects they have[1].

The paper is structured as follows: in the second section we review some contributions in the literature on how territorial factors affect firm demography; in the third section we describe and analyse the units for measuring firm demography and geographical variables within the framework of the firm's entry into the market; in the fourth section we analyse the unequal incidence on entries exerted by different urban areas; in the fifth section we review firm demography and city size for the case of Spain; the sixth section contains the model and results and finally the seventh section summarises our main conclusions.

2. Territorial approaches to entry and exit

Empirical contributions on the phenomenon of firm demography that consider territory as a factor in their analyses agree that according to the regional characteristics there are noticeable differences in regional firm entry rates. The cases of Great Britain (Ashcroft et al., 1991; Barkham, 1992; Fotopoulos and Spence, 2001; Keeble and Walker, 1994), France (Guesnier, 1994), Sweden (Davidsson et al., 1994), Germany (Brixy and Niese, 2003; Audretsch and Fritsch, 1994), the United States (Rigby and Essletzbichler, 2000; Campbell, 1996), Finland (Kangasharju, 2000), Norway (Spilling, 1996), Italy (Garofoli, 1994), Greece (Fotopoulos and Spence, 1999) and Spain (Arauzo et al., 2002) are reported. In the Spanish case, for example, it is shown that the variation of entries (exits) is not distributed randomly in space and that a certain territorial dis-continuity appears between the most dynamic regions and those registering lower entry rates. We should point out the high correlation between the regional

[1] This is because a small size implies the availability of few resources, so these firms must depend on the facilities available where they are located. This dependence diminishes as the size of the firm, and its ability to internally supply the services not offered by the market, grow.

Gross Rate of Entry (GRE) and Gross Rate of Exit (GRX): the regions with high GRE also have high GRX.

One of the main criticisms of the studies related to firm demography from a territorial point of view is that they do not consider urban issues. There are exceptions, however. After observing the regional variations in the rates of firm entry in France, Guesnier (1994) explains that this phenomenon is not due to regional variations in the explanatory variables but to the fact that different regional typologies can be identified, partly by the predominant urban structures. He therefore establishes five types of regions: mainly urban, residential, rural manufacturing, technological environment and locally integrated. Also from a European point of view, Berglund and Brännäs (2001) analyse the entry and exit of firms in Swedish municipalities, and conclude that the probability that a firm chooses to locate a plant depends on the municipality characteristics. Armington and Acs (2002) and Acs and Armington (2003) use the local labour markets as territorial areas of reference to study firm entry. Their results show that territorial differences are caused by differences in weight of the manufacturing sector, population growth, income growth and human capital assets. Campbell (1996) analizes entry decisions in US states using, as an explanatory variable, the percentage of the state's population living in urban areas, given that (p. 172): “a greater number of potential customers generally live within a given radius of a firm in an urban area than in a rural area, so that we would expect the percentage of the population living in urban areas to have a positive impact on new business formation”. His results confirm his expectations.

With regard to the incidence of urban areas on firm entry, and according to the theories of the product life cycle and the nursering cities, the type of city required by firms is not neutral to the level of technological maturity of the activity sector or to the age of firms. These theories explain why the innovating activities locate in larger cities, as well as their later geographic mobility. The theory of the product life cycle argues that new products (and new firms) are

created mainly within the large metropolitan areas, where there is an innovating environment and skilled labour. Later, once products have reached maturity (when the introduction of new technology stops), production is decentralized towards smaller cities (located at the periphery of larger urban metropolitan areas), where firms can benefit from lower costs. This process can continue until the firm locates in an underdeveloped country. At this point, the product is entirely standardized and the requirements of innovating firm environment and skilled labour are minimum. Thus, Duranton and Puga (2001) link the manufacturing location patterns to the product life cycle: in the initial phases diversified environments are preferred. Later, once the technology has been defined, the firms are relocated in specialized environments to use this technology. This situation is observed with French data, for instance.

The theory of nursery cities suggests that new firms locate in the central areas of the large cities, where they can enjoy the kind of environment required at the initial stages. Later, when they reach a certain level of maturity, they move towards peripheral locations. In this sense, larger manufacturing metropolitan areas offer advantages to new firms, such as the availability of services and equipment and the proximity to markets (Vernon and Hoover, 1959) that facilitate the entry of the firm and its survival in the first few years of life when firm mortality rates are highest.

One of the most obvious limitations in the contributions that consider territorial factors as determinants of firm entry is that they suppose that such factors affect all manufacturing industries equally. This does not correspond with the empirical evidence, which clearly shows contradictory results with regard to certain territorial variables. Audretsch and Fritsch (1999), for example, show that much of the work done on territorial factors starts from a model like the following:

$$S_j = \alpha + \beta_{1j} X_{1j} + \beta_{2j} X_{2j} + ... + \beta_{kj} X_{kj} \qquad (1)$$

where S is the entry rate in region *j*, and X corresponds to different territorial variables. Such a model considers that the β parameters are the same for all industries. In an attempt to solve some of the bias that derives from this approach, Audretsch and Fritsch (1999) suggest an alternative model in which the β parameters are specific for each sector *i*:

$$S_{ij} = \alpha_i + \beta_{1ij} X_{1ij} + \beta_{2ij} X_{2ij} + ... + \beta_{kij} X_{kij} \quad (2)$$

By extending the previous model we can determine the extent to which the influence of a territorial variable is altered by the specific characteristics of the industry. Therefore, we have:

$$\beta_k = \phi + \phi_{1k} Z_{1k} + \phi_{2k} Z_{2k} + ... + \phi_{mk} Z_{mk} \quad (3)$$

where β is the parameter considered in equation (1) and Z_m is a variable of each specific industry. Equation (3) shows that the variations in the parameters considered in (2) are not random but related to the characteristics of the industries.

We assume the Audretsch and Fritsch (1999)'s approach, in which territorial variables have a different impact on each sector, but adopt a municipality size rather than the regional one. This is because external economies are not homogenously distributed in the regions and their intensity is related to municipality size.

3. Measurement and variables of firm demography

Firm demography is a phenomenon that admits multiple measurement units: firm entry can be analysed using different indicators, which, nevertheless, are

not neutral to the results.[2] This diversity of measurements responds to the need to standardize firm entry in an attempt to avoid the bias of comparing territorial units of very different sizes. With regard to the variables used to standardize entries, population is known as "population perspective", the number of workers is known as "labour market perspective", and the number of firms is known as the "ecological perspective".

In the "population perspective", new firms are created by the inhabitants of the area in which firms are located and this process is strongly influenced by local market expectations. The "labour market perspective" is based on the assumption that agents decide to set up a new firm project within the labour market from where they came and where they have have previous labour experience. Of the studies with the "population perspective", the one by Garofoli (1994) stands out. The "labour market perspective" is followed, among others, by Keeble and Walker (1994) and Ashcroft et al. (1991), who use active workers, by Johnson (1983), who uses male employees in manufacturing firms;[3] by Kangasharju (2000), who uses workers, and by Keeble and Walker (1994), who base their study on sectorial occupation.

The most usual measurement of the gross entry rate (GRE) is the ratio between new establishments (firms) and ones that existed in the previous period ("ecological perspective"). This approach is based on the fact that new firms are created from active ones in a process known as spin out. The active firms in the market act as nursery firms for new ones. One of the problems with this "ecological perspective" is that it does not consider the size of firms (either existing ones or new ones), which is an important issue given the empirical evidence that shows that the entrants are smaller than incumbents.[4] A solution to this problem could be to break down the GRE by size in order to more accurately determine the penetration of the entrants within each dimension

[2] In this sense, Garofoli (1991) shows that results can depend on the measure used. See also Ashcroft et al. (1991), Guesnier (1994) and Keeble and Bryson (1993).
[3] This variable is used as a denominator because manufacturing ocupations are basically male. This variable loses its meaning if analysed in services, where this phenomenon is not found.
[4] For the Spanish economy, see Callejón and Segarra (1998).

strip. This technique would solve the problems caused by comparing the manufacturing structures of very different sizes.

In any case, the literature does not reach an agreement on using the firm stock as a denominator. Some authors are in favour of considering it (Storey and Jones, 1987; Johnson and Parker, 1994) and others are not (Garofoli, 1991). Some studies (Keeble and Walker, 1994) integrate firm stock into other variables. In answer to scholars who are sceptical about using firm stock as a denominator, Garofoli (1991)[5] argues that there is a structural difference between new firms (small) and the active ones in the market (medium or large) and assumes that there is an implicit cause-effect relationship between the initial stock and firm entries. The structural differences of firm sizes based on geographic area or activity sector restrict the comparison of entry rates. Also, the value of the denominator is downsized (especially when it is broken down in the sectorial or territorial scale), which even results in a higher entry rate despite the presence of fewer new firms (in general, these entry rates present a very low dispersion on an interregional scale and come near the national average). Other critics (Ashcroft et al., 1991) believe that the "ecological perspective" reflects the entry rate of previous periods, so that if a region had experienced a low entry rate in the past, the stock denominator would imply an artificial increase in current entry rates.

In any case, as there is a lack of consensus among scholars about which of the three previously analysed approaches to use, we have used the “ecological perspective” because, as we assume that new firms are mainly created from existing firms and previous population and previous workers are less important determinants, it measures the entry phenomenon better[6]. Nevertheless, this could be an interesting issue to discuss.

[5] To ilustrate these criticisms, Garofoli (1991) shows firm entry rates to the Italian provinces (1986) depend on the denominator used (firm *stock*, inhabitants or active workers).

[6] Specifically, previous population and previous number of workers could be biased measures of entrepreneurship because they do not take into account, respectively, demography and industrial structure. Therefore, municipalities with similar numbers of inhabitants but different

Another solution is to use penetration rates (PR), in which the numerator does not refer to new firms but to the job (investment) created by such firms, and the denominator is formed by the employment (capital stock) in the whole economy. Arauzo et al. (2002), for example, show that for the Spanish autonomous regions the employment and capital penetration rates are systematically lower than the GRE, and that this is attributed to the fact that the size of new firms entering the market is lower than the optimal one (either in terms of employees or investment).

With regard to geographical variables, according to Pablo (2000), the literature has tackled the territorial difference of firm entry rates from two different perspectives. The first perspective, the "seedbed hypothesis", considers that firms are not created in *a priori* more profitable territories, but close to the locality of the entrepreneur (Figueiredo et al. 2002, 1999; Meester, 2000; Pred, 1967) in order to minimise the potential risk due to creating a firm in an unknown market, even though the expected profitoffered by this unknown market could be greater. On the other hand, the network of personal contacts in an entrepreneur's original locality encourages the creation of a new firm (access to other people's financing, clients and suppliers, etc.). The second perspective, the "nursery hypothesis", considers that territories have certain characteristics (e.g. accessibility to skilled labour, specialised suppliers or technology) that encourage the creation of firms in certain areas.

In any case, irrespective of the logic involved in firm location, the literature uses a set of variables as explanatory factors of firm entry. Despite their heterogeneity, these variables can be grouped as follows: level of activity (GDP, income per capita, etc.), population (variation, distribution by age, etc.), politics (support for certain political parties), sociology (characteristic of the housing market, immigration, etc.), the labour market (unemployment, etc.), industry

age structures can have different capacities for creating new firms. The same is true of industrial structure, since municipalities characterised by small firms are more likely to create new ones.

(industrial mix, specialization levels, firm size, wage levels, etc.), public policies (manufacturing and public tax policies, etc.) and human capital.

4. Firm creation and urban environment

The latest contributions within the framework of the new economic geography (Fujita et al., 1999; Alonso and de Lucio, 1999) emphasize the asymmetric nature of the territory in which the economic activity is developed. This literature[7] shows that territorial heterogeneities determine whether a territory has a differential capacity to attract and maintain new firms. The territorial environment therefore conditions the success or failure of these projects.

The role of cities

Cities provide the environmental elements that firms need to develop their activities with the maximum guarantees (Kim, 1997). These environmental elements include such different aspects as the level of labour qualification, the existence of telecommunications and transport infrastructure, the presence of specialized suppliers able to respond to business demands, the existence of a business climate or a creative atmosphere that is the product of the local tradition in a certain activity, and knowledge spillovers which allow technological or organizational advances to move without restrictions from one firm to another over short distances. These environmental elements do not operate the same way in all economic activities or at the margin of the cycle of the product.[8]

In this sense, Duranton and Puga (2001) state that in an initial phase of product development firms prefer diversified urban environments (large cities), but in the transit towards mature products with stable technologies, they modify their

[7] See Ottaviano and Puga (1998) and Schmutzler (1999) to find a revision of the "new economic geography".
[8] See Klepper (1996) and Blom and Karlsson (2000).

preferences and move to urban peripheries (or smaller cities)[9] specialized in that activity. There is empirical evidence that links the urban environments in which firms operate with firm entry rates and firm survival.

Here we assume that the weight of external economies depends on the size of the city. The size of the city is therefore the element that allows us to group those territories where external economies are intensive and similar and is therefore a good proxy for the territorial aspects affecting firms. For example, in large cities several phenomena occur that encourage or discourage firm entries. These phenomena are different from those that occur in smaller cities. This approach is substantially different from most of the previous ones used to analyse firm demography, where the role of territory is approached from a regional perspective by considering that regions have different abilities to attract and consolidate new firms. Here, we take into account cities rather than regions.

The regional perspective implies the existence of territorial homogeneities within each region. However, the reality shows that space is asymmetrical, and this asymmetry is indeed marked by cities. Firm entry rates are higher in larger cities and their metropolitan areas because of the abundance of resources and opportunities offered by larger markets and because they are more attractive. Empirical evidence shows the cases of Sweden (Delmar and Davidsson, 2000; Davidsson et al., 1994), Portugal (Brandão and Madruga, 1997), West Germany (Fritsch, 1992) and France (Guesnier, 1994), among others. This was a dominant perception until the last few years, but recent evidence shows that metropolitan centres (or at least larger city centres) are declining in comparison with smaller cities or rural areas. This phenomenon is known as urban-rural shift (see Phelps et al., 2001). The origin of these changes seems to be the desire of small firms to avoid the agglomeration diseconomies of larger cities (higher land

[9] The correlation between urban dimension and sectorial specialization/diversification level is an accepted reality in the literature. See, for example, Begović (1992), Monastiriotis (2000) and O'Donoghue (1999).

prices, congestion, wage premiums, etc.).[10] Assuming the existence of these structural changes, one of the aims of this paper is to analyse the extent to which they are also found in Spanish manufacturing industries.

These changes can be interpreted as the trade-off between agglomeration economies and diseconomies: first they generate benefits for the agents who concentrate locally and attract more agents (centripetal forces), and second they act in the opposite sense by generating diverse costs associated with proximity, restricting the location of new agents and even expelling the already active ones towards the outside (centrifugal forces). With regard to the larger cities, therefore, both forces (centrifugal and centripetal) have rebalanced in such a way that the first have gained weight with respect to the second. This process has occurred inversely in small municipalities with good accessibility (indispensable condition) to the centres of larger cities.

Depending on the type of activity developed by new firms, it is essential to have a suitable level of industrial disaggregation because the location patterns are not homogenous between sectors. The explanation is simple: firms belonging to different sectors also have different environmental requirements (Davidsson et al., 1994; Audretsch and Fritsch, 1999). Some of these requirements can be satisfied locally (local networks of suppliers, the extent and quality of transport infrastructures, telecommunications or energy, skilled labour markets, etc.). The rest have a provision with no spatial dimension (specialized services, access to the other people's financing, research and development, etc.). However, since cities are asymmetrical, the response to local requirements varies according to the dimensions of the city. Depending on the size, firms will or will not be able to accede or to certain services (the kind of services offered depends on the size of the city). Consequently, firms in different industries will tend to locate in different types of cities. Taking into account our previous explanations, it is

[10] Among other explanatory elements of the (apparently) greater attractiveness of the periphery is the belief that in larger cities market competition is stronger, so that the likelihood of survival is lower. This is demostrated, for example, in the analysis of firm entry in Athens compared to that in the rest of Greece (Louri and Anagnostaki, 1995).

important to study the requirements of firms and the characteristics of the urban areas in which these firms are located.

Despite the specific requirements of each industrial activity, the empirical evidence shows that the ability of new firms to survive depends on the locational scope. For the British case, for example, Barkham (1992) states that agglomeration economies enable environments that offer higher guarantees of firm survival to be created. This author also uses two hypotheses to explain why some territories offer more guarantees than others. First, in the Structural Hypothesis, he emphasises the supply of entrepreneurs, in the sense that the local economic structure determines the type of business people that emerge. He considers that people with previous experience in the industry develop new business initiatives, so areas that are well endowed with human capital offer new firms perspectives for greater success. Second, in the Environmental Hypothesis, he stresses the importance of the economic environments in which new firms operate. He highlights factors such as the level of public expenditure, the ease with which other people's financing can be obtained, the location of higher education institutions and research centres, and the availability of qualified blue-collar labour.

Types of cities

The Spanish Statistics Institute (INE) divides cities into three large groups according to their size: urban areas (towns or cities with more than 10,000 inhabitants), intermediate areas (between 2,001 and 10,000 inhabitants) and rural areas (up to 2,000 inhabitants). The disadvantage of this classification is that the cities in the “urban areas” are category very heterogeneous (for instance, a town of 15,000 inhabitants belongs to the same category as a city of 1 million inhabitants). We therefore propose a typology of cities[11] with the following groups:

[11] Specifically, the group with up to 2,000 inhabitants contains 5,947 municipalities; the group with between 2,001 and 10,000 inhabitants contains 1,538 municipalities; the group with between 10,001 and 50,000 inhabitants contains 485 municipalities; the group with between

- Up to 2,000 inhabitants,
- Between 2,001 and 10,000 inhabitants,
- Between 10,001 and 50,000 inhabitants,
- Between 50,001 and 100,000 inhabitants,
- Between 100,001 and 500,000 inhabitants,
- More than 500,000 inhabitants.

Localities belonging to the same population group are broadly speaking homogenous in their ability to attract firms and guarantee their survival.

A classification such as the previous one still has a certain arbitrary element because the homogenous nature of a group of municipalities can be measured by a range of very different variables, only one of which is population. Bearing in mind the validity of other possible groups, in this paper we consider that city size involves a sufficient homogeneity.

Table 1
Population dynamics according to municipality size (1991-2001)

	Municipality size (inhabitants)*						
	0-2,000	2,001-10,000	10,001-50,000	50,001-100,000	100,001-500,000	More than 500,000	Total
1991	3,113,591	6,615,901	9,169,692	3,601,953	9,163,242	7,206,473	38,870,852
2001	2,997,457	6,653,954	10,513,191	4,231,284	9,446,485	7,005,000	40,847,371
Variation (%)	-3.73	0.58	14.65	17.47	3.09	-2.80	5.08

* Municipalities classified according to number of inhabitants of 1991. We do not include all the municipalities.
Source: Own construction from National Spanish Statistics (1991 and 2001).

If we analyse the population dynamics of Spanish municipalities between 1991 and 2001, we can see in Table 1 that the municipalities that experienced the highest demographic growth were the smallest ones. The reverse was true for the large urban areas, where progress was below average.

50,001 and 100,000 inhabitants contains 55 municipalities; the group with between 100.001 and 500.000 inhabitants contains 49; and the group with more than 500,000 inhabitants contains 6 municipalities (Madrid, Barcelona, Valencia, Seville, Saragossa and Malaga).

The socio-economic characteristics and the labour market in these groups present a certain homogeneity. We can see in Table 2 that the unemployment rate is strongly linked to the industrial specialization of municipalities and that the population's level of education grows as the size of the municipality increases (from 3.11% of inhabitants with higher education in municipalities with up to 2,000 inhabitants to 10.0% in those with more than 500,000). This situation also occurs in relation to the service industries and other variables.

Table 2
Socio-economic characteristics of Spanish inhabitants (1991)

	Municipality size (inhabitants)						
Variables (%)	0-2,000	2,001-10,000	10,001-50,000	50,001-100,000	100,001-500,000	More than 500,000	Total
Activity rate	57.88	59.71	59.15	58.10	58.63	61.11	59.30
Unemployment rate	16.53	18.95	19.71	20.56	20.14	16.73	18.94
Inhabitants aged between 25 and 44.	23.89	26.66	28.57	29.70	29.18	27.87	27.99
Manufacturing jobs	20.25	25.43	29.08	29.68	28.37	26.07	27.08
Service jobs	36.30	43.56	55.95	66.21	71.72	76.58	61.18
Inhabitants with higher educat.	3.11	3.13	4.12	5.54	6.66	10.00	5.60

*Note: Activity rate (%) = Active inhabitants /Potential active inhabitants (between 15 and 64 years) * 100. Unemployment rate (%) = Unemployed inhabitants /active inhabitants * 100. Manufactuing occupation (%) = Manufactuing occupation /total occupation * 100. Service occupation (%) = Service occupation /total occupation * 100. Inhabitants with university education (%) = Inhabitants with higher education / total inhabitants 1991 * 100.*
Source: Elaborated with CERCA100.

One aspect that deserves special analysis is the population distribution within each group, since the existence of potentially protagonistic population groups, i.e. individuals between 25 and 44 years of age, is considered a necessary condition for firm entry dynamism. Within this age group, a higher level of education and an entrepreneural attitude combine to assume the risks entailed in running one' own business. This is the age group with the highest percentage of individuals who own entering firms.[12] From this evidence, it is important to note that these individuals are not equally represented in all the groups of municipalities.

The previous situation may be caused by two phenomena, the intensity of which has increased over the years. The first one is the rural-urban migration of the young population (specifically, highly educated individuals who do not match the qualification level needed for labour opportunities in certain small localities). The second one is the expulsion of the young population from the largest cities to others of intermediate size due to increases in house prices.

Several scholars have formulated mainly two types of hypotheses to explain how variables such as the average unemployment rate affects the entry of firms. The first one (*push*) states that the unemployed are involuntarily designed to develop a business project because the possibility of their being employed by other firms is low (Thomas and Jungbauer-Gans, 1999; Audretsch, 1993; Meager, 1992; Storey, 1991 and 1982; Evans and Leighton, 1990). The second one (*pull*) argues that situations of under-unemployment, and therefore with economically favourable expectations, stimulate the entry of firms. Some scholars have shown that, at a regional level, the role of unemployment is ambiguous (Ritsilä and Tervo, 2000; Delmar and Davidsson, 2000; Spilling, 1996; Tervo and Niittykangas, 1994; Storey, 1991 and Hamilton, 1999). In a situation of high unemployment (the *push* hypothesis),[13] a weak level of demand feeds unemployment but also leads to a greater availability of labour, machinery and second-hand equipment (as a result of the exit of firms). On the other hand, a situation of low unemployment (the *pull* hypothesis) indicates a strong level of demand, high regional growth and competitiveness. It must be stated, however, that long-term unemployment has negative consequences on the knowledge and abilities of the workers, and the lower quality of the labour force makes it difficult for firms to enter the industry and survive.[14]

[12] Reynolds (1997), for example, concludes that 71% of start-ups are located in the 25-34 age group.
[13] Some authors consider that *push* motivations are related to a higher level of firm exits than *pull* ones, though there is no clear evidence (Delmar and Davidsson, 2000).
[14] Reynolds (1997) points out that although some empirical studies using added data have found a positive relation between rates of unemployment and rates of firm entry, individually, his results show that most new firms are not created by the unemployed.

Other variables can influence entry decisions. One of these is the availability of skilled labour. As an educated workforce is necessary for firms, we expect this variable to have a positive effect on entries. Unfortunately, we do not have data on skilled labour for all the years in our data set.

5. Firm demography and city size: an application for the Spanish case

One of the axes of this paper is that the specificities of each municipality size also differ in their ability to attract and retain manufacturing establishments, so that the entry, survival and exit of the firms in the markets are strongly determined by the urban environment in which they are located (measured here by population size).

Table 3
Gross Rate of Entries (GRE) by city size*

	Municipality size (inhabitants)						
	0-2,000	2,001-10,000	10,001-50,000	50,001-100,000	100,001-500,000	More than 500,000	Total
1994	11.41	12.48	12.89	13.10	12.62	11.30	12.37
1995	11.14	12.74	13.68	13.32	13.52	11.58	12.85
1996	8.40	8.78	9.78	9.90	8.95	8.62	9.11
1997	7.93	9.42	10.07	10.05	9.75	9.47	9.57
1998	8.56	9.59	10.35	10.30	12.03	9.95	10.27
1999	8.67	9.80	10.04	10.68	10.33	7.39	9.57
2000	7.70	8.54	9.06	9.64	9.94	11.68	9.42
2002	6.40	7.53	8.15	9.89	8.10	8.43	7.99
Mean	8.78	9.86	10.50	10.86	10.66	9.80	10.14
Est. des.	1.70	1.84	1.87	1.48	1.88	1.61	1.66

**Data are for manufacture firms with employees (industries 15 to 36 from CNAE-93).*
Source: Own elaboration with DIRCE data.

Table 3 shows that, generally, the rates of entrance increase as the size of the municipality increases. The exceptions to this rule are (within most of the temporary frameworks considered) cities with over 500,000 inhabitants, whose

gross rates of entries (GRE) are lower perhaps because of greater barriers to the entry caused by greater competition in these markets. [15]

These results for entry rates do not corroborate the findings of other scholars such as Campbell (1996), though the databases are not strictly comparable. The results of Campbell (1996) show that the greater the percentage of the population living in urban areas, the more new firm enter. From our data, however, it is not possible to find this kind of linear relation, perhaps because we disaggregated city sizes more than Campbell. On the other hand, our results do agree with those of Louri and Anagnostaki (1995), who analysed the Greek case and found that Athens was less attractive to new firms than the rest of the country.

Table 4
Correlation between GRE, GRX and the other territorial characteristics[16]

	GRE	GRX	DENSI	VARPOB	AGE	UNEM	MANUF	HC	URB
GRE (gross rate of entry)	1.000								
GRX (gross rate of exit)	0.4927	1.0000							
DENSI (population density)	-0.1647	0.1169	1.0000						
VARPOP (population variation)	0.0215	-0.1666	-0.4905	1.0000					
AGE (% inhabitants aged between 25 and 44)	0.0315	0.1826	0.2051	-0.8162	1.0000				
UNEMP (unemployment rate)	0.1363	0.0972	-0.4198	-0.4526	0.7791	1.0000			
MANUF (% manufacturing jobs)	0.0560	0.1554	0.0736	-0.7869	0.9792	0.8353	1.0000		
HC (inhabitants with university education / Km^2)	-0.1434	0.1707	0.9187	-0.6196	0.4588	-0.1719	0.3087	1.0000	
URB (employees/ Km^2)	-0.1667	0.1102	0.9989	-0.4739	0.1771	-0.4486	0.0482	0.9080	1.0000

Source: Central Directory of Companies, National Institute of Statistics and CERCA100.

[15] The discontinuity in the GRE and the GRX in the municipalities of over 500,000 inhabitants may be due to an inappropriate design for the population sections .

Table 4 shows that the strongest correlation with respect to manufacturing firm entries occurs with exits (GRX = 0.4927), which means that entries and exits are strongly linked. Table 4 also shows that population density (DENSI) and human capital (HC) affect the entries (GRE) in a negative way. This could be explained by the existence of agglomeration diseconomies that spread new entries to less dense areas. On the other hand, the rate of unemployment (UNEMP) has a positive relationship with GRE, so we can accept the hypotheses that the unemployed create their own business projects to solve their own unemployment situation.

6. Model and results

Model

We based our choice of econometric model on avoiding any kind of bias. We used the Breusch and Pagan test (table 6), which rejects the hypothesis that the intercept terms are invariant across cross-sectional units. We therefore estimated a panel data because it takes into account the variance of the intercept.

Panel data estimation has been used in the recent literature on firm demography (Kangasharju, 2000 and Gaygisiz and Köksal, 2003). One of the main advantages of using panel data is that the slants derived from the non-observable heterogeneity can be controlled. A second aspect concerns the specification errors caused by the omission of important non-observable variables, which are solved by introducing latent variables.

The choice of whether to estimate “random” or “fixed” panel data is made through the Hausman test. We applied a random effect model because we

[16] We can also use the database provided by DIRCE to analyse the survival of firms in the markets inside the same urban framework as that used to study the entrance of firms, but this is not the aim of this paper.

accepted the hypothesis that the coefficients in the fixed and random effect models are similar in almost all the municipality sizes (Mundlak, 1978).

Our econometric estimations follow the regression model in Baltagi (2001) and Mátyás and Sevestre (1996):

$$y_{it} = \alpha + \beta X'_{it} + u_{it} \ (i = 1,..., N; t = 1,\ldots, T) \qquad (4)$$

The dependent variable (y_{it}) is a vector of dimension *NxT* that contains the logarithm of the gross rate of entry of firms in an industrial sector (*i*) in one calendar year (*t*). There is therefore a double dimension in our data panel. On the other hand, the explanatory variables are independent of the disturbances, and observations have been extracted from the same population, $u_{it} \sim i.i.d.(0, \sigma^2)$. The sample defines a complete micro panel with 140 observations for each variable: the number of individuals (i = 20) is relatively high in comparison with the temporary periods (t = 1994...2001).

In this paper we assume that a firm's decision to enter is not indifferent to the urban environment in which it is located. Different municipalities have differential abilities to attract new business initiatives i.e. the activities carried out within each industry have certain environmental requirements that are not the same in all types of cities, and firms will therefore tend to locate in a specific kind (size) of city according to the manufacturing industry to which they belong.

Here we will analyse the territorial factors affecting the entry decisions of manufacturing firms in Spanish municipalities i.e. to what extent do industry factors have an unequal incidence on the different groups of city sizes. Since we have information about three dimensions (size, sector and time), we can add a third dimension (municipality size) to the previous models (those of Baltagi, 2001, and Mátyás and Sevestre, 1996). Therefore, our model uses the following expression, in which we obtain estimates for each municipality size and check

whether the effect of the explanatory variables on firm entry depends on municipality size:

$$LNGRE_{sit} = \beta_0 + \beta_1 LNGRX_{sit} + \beta_2 PCM_{it} + \beta_3 CR10_i + \beta_4 \Delta AVMANUF_i + \beta_5 INVEST_{it} + \\ + \beta_6 R+D_{it} + \beta_7 \Delta GDP_{t+1} + \beta_8 DENSITY_s + \beta_9 UNEMP_{it} + \mu_{it} \quad (5)$$

where $LNGREX_{sit}$ is the logarithm of the firm entry gross rate in the municipalities of population section *s* and sector *i* in *t*; $LNGRX_{sit}$ is the logarithm of the firm exit gross rate in the municipalities of population section *s* and sector *i* in *t*; PCM_{it} is the price-cost margin; $CR10_i$ gathers the market structure from the concentration index *CR10* (market share of the ten main firms); $\Delta AVMANUF_i$ is the cumulative average annual rate of variation of the sectorial Added Value; $INVEST_{it}$ is the average investment by firm; ADV_{it} shows the advertising expenses and is a proxy for product differentiation; $R+D_{it}$ corresponds to research and development expenses and measures the technological intensity of the sector; ΔGDP_{t+1} is the inter-annual variation ex-post rate of the GDP and measures the economic expectations; $DENSITY_s$ is the population density, $UNEMP_{it}$ is the unemployment rate, and μ_{sit} is a random disturbance.

Variables

In this model, the gross rates of entry for various types of cities are explained by the impact of diverse variables that can be grouped in four vectors (Table 5). The first vector includes the sectorial variables (exit gross rate, minimum efficient size, price-cost margin, market structure, growth of the added value of the industry and average investment by firm in each industry). The second vector includes the variables relative to the firm's behaviour (product differentiation and technological intensity). The third vector refers to the cyclical nature of the markets (growth in Spanish GDP). Finally, the fourth vector includes specific territorial variables (population density).

Other variables must also be considered because they probably have an affect on the entry and exit of firms, but as usual, there is a clear lack of good, territorially disaggregated data.[17]

Table 5
Determinant of entries according to size of municipality

Variable	Description
Dependent variables	
LNGRE	Gross Rate of Entry
Industry variables	
LNGRX	Gross Rate of Exit
PCM	Price-cost margin
CR10	Market structure
ΔAVMANUF	Cumulative average rate of annual variation of the industrial added value in the period 1993-1997
INVEST	Average investment by each firm in the industry
Behaviour variables	
R+D	Technological intensity
Cyclical variables	
ΔGDP	Inter-annual variation ex-post rate of the GDP
Territorial variables	
DENSITY	Population density at a municipality level
UNEMP	Unemployment rate at a municipality level

Source: Own.

Population density (DENSITY) is the total population of each municipality of the same size divided by the total area of those municipalities. This variable measures the market dimension as well as the concentration of supply of goods and services in a territory. It also shows the extent to which the firm entry patterns are related to the territorial arrangement of the population and could be a good proxy for agglomeration economies.

Results

We present the results of the econometric estimation of equation (4). Here, dependent variable is the gross rate of entries (GRE) and we assume that the

[17] Solé and Viladecans (2003) analyse the incidence of municipal tax rates on employment creation in municipalities with more than 5,000 inhabitants in the province of Barcelona during the decade of 1990. Their conclusions confirm the importance of municipal taxation in the job creation, but only in cases where there are differences in municipal tax rates in comparison to near municipalities.

vectors of variables vary according to municipality size. Note that we have not included data from the manufacture of tobacco products (CNAE-16) or from the manufacture of coke, refined petroleum products and nuclear fuel (CNAE-23), because there are very few observations.

Table 6
Determinants of firm entries according to size of municipality (random effects model)

	Size 0	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Industry variables							
LNGRX	0.4950	0.2346	0.2211	0.4175	0.1727	0.3408	0.0631
	(0.066)*	(0.069)*	(0.064)*	(0.066)*	(0.084)**	(0.090)*	(0.103)
PCM	1.9078	1.3042	1.1636	2.2944	1.1025	1.7984	1.6872
	(0.568)*	(0.985)	(0.743)	(0.634)*	(0.917)	(0.873)**	(0.959)***
CR10	-0.0044	-0.0076	0.0045	0.0061	-0.0026	-0.0072	-0.0408
	(0.016)	(0.028)	(0.021)	(0.018)	(0.026)	(0.025)	(0.028)
ΔAVMANUF	-0.0288	-0.0670	-0.0381	-0.1018	-0.0174	-0.0031	-0.1879
	(0.030)	(0.064)	(0.044)	(0.035)*	(0.052)	(0.050)	(0.062)*
INVEST	-0.0001	-0.0003	-0.0003	-0.0002	-0.0006	-0.0001	-0.0006
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)**	(0.000)	(0.000)**
Behaviour variables							
R+D	5.1489	9.1978	8.0757	7.2534	4.4807	7.1993	8.2223
	(1.230)*	(1.762)*	(1.421)*	(1.380)*	(1.824)*	(1.722)*	(1.657)*
Cyclical variables							
ΔGDP	-8.2270	-3.4503	-0.2986	-4.0606	-10.2698	-5.0946	-7.9794
	(1.968)*	(3.341)	(2.400)	(1.838)**	(2.688)*	(2.669)**	(3.348)**
Geographical variables							
DENSITY	1.1239	-0.0049	0.0059	0.0010	0.0002	0.0007	0.0001
	(0.638)***	(0.001)*	(0.001)*	(0.000)*	(0.000)	(0.000)*	(0.000)***
UNEMP	0.0337	0.0580	0.0488	0.0359	0.0245	0.0388	0.0567
	(0.009)*	(0.016)*	(0.010)*	(0.008)*	(0.011)**	(0.012)*	(0.014)*
Constant	-73.0807	1.3363	1. 0309	0.7879	1.8474	0.6750	1.3916
	(41.947)***	(0.228)*	(0.197)*	(0.163)*	(0.218)*	(0.231)*	(0.252)*
$\chi 2$ (Wald)	349.41	93.63	184.04	317.42	75.08	144.05	92.96
Fixed effects vs. random effects (Hausman)	77.10 (0.0000)	32.36 (0.0002)	20.91 (0.0131)	14.16 (0.1168)	20.32 (0.0160)	13.79 (0.1300)	121.91 (0.0000)
Random effects test (Breusch-Pagan)	129.17 (0.0000)	45.71 (0.0000)	32.06 (0.0000)	123.68 (0.0000)	86.15 (0.0000)	89.19 (0.0000)	45.69 (0.0000)
N	140	140	140	140	140	140	140

(*) significance at 1%, (**) significance at 5%, (***) significance at 10% ; standard deviation in brackets.

Although our results should be interpreted with caution given the scarcity of available data at the local level, they show that some characteristics linked to the urban environment affect gross rate of entries (GRE).

The gross rate of exits (GRX) acts positively on entries in all kinds of cities (GRX variable shows positive and significant values). The fact that entries and exits are not independent implies that within manufacturing industries and municipalities with a high rate of exits, a reassignment of business resources encourages the creation of new firms (Arauzo et al., 2002). This phenomenon is smaller for the larger municipalities, where the exits are less important and not significant for the new entries.

Surprisingly, the cumulative average rate of annual variation of the manufacturing added value in the period 1993-2001 (AVMANUF) affects entries negatively in all groups of municipalities but is significant only for municipalities of sizes 3 and 6. In this sense, Audretsch and Fristsch (1994) obtained the opposite results with the entire manufacturing sector. Our results can be explained by the asymmetric information between incumbents and potential entrants, so entrepreneurs who are not working inside the market are not aware of the expected profits in the industry.

The average investment by each firm in the industry (INVEST) acts as a barrier to entry for all types of municipalities, but especially for the largest group. This means that it is more costly to start up new businesses in large cities. These results are in agreeement with those of Audretsch and Fritsch (1995), although we desaggregated for each municipility size group. The effect of market concentration (CR10) is positive for municipalities of between 2,000 and 50,000 inhabitants and negative for the rest, but is not significant in any case. So, for example, a greater concentration of the market in a small number of firms restricts entrances in larger municipalities and encourages entrances in smaller municipalities. Garofoli (1994) reported a negative impact of market concentration on firm entry rates, which is in agreement with results of size 0 (industry independent of city size), while Guesnier (1994) reported a positive impact for the entire manufacturing sector.

The level of technological intensity (R+D) has a significant positive effect on entries irrespective of the size of the municipality. However, the graph of this impact is U-shaped because the smallest and largest municipalities have higher values. Gassler (1998) showed that in Austria the entry rate of innovating firms was the highest in the least populated Austrian cities. We can therefore accept the urban incubator hypothesis in Spain, but we must also accept the presence of an urban-rural shift. With regard to cyclical variables, gross domestic product (GDP) has a negative impact on entries and this is significant in municipalities with over 10,000 inhabitants. These results do not agree with those of Campbell (1996), for instance, but the anticyclical pattern of new entries can be interpreted in line with the positive incidence of unemployment: high levels of unemployment and a restraint in increases of the GDP usually are simultaneous.

With regard to territorial characteristics, population density (associated with the existence of agglomeration economies) is significant for all municipalities except size 4. Also, its effect depends on the size of the municipality, since it favours the entrance of industrial establishments in municipalities with more than 2,000 inhabitants. These results agree with those of Audretsch and Fritsch (1994), Guesnier (1994) and Gaygisiz and Köksal (2003). However, the coefficient is higher in cities with between 2,000 and 50,000 inhabitants. This could be related with the relocation of manufacturing activity on the periphery of the larger cities in order to avoid agglomeration diseconomies linked to the traditional manufacturing concentrations and benefit from smaller costs in the smaller municipalities, though not in the smallest municipalities, where firms do not have access, for example, to skilled labour or good public infrastructure.

The unemployment rate (UNEMP) has a significant and positive effect on all groups (in agreement with Evans and Leighton, 1990; Storey, 1991; Audretsch and Fritsch, 1994; Campbell, 1996; and also with Azevedo and da Silva, 2003, but our results partially differ from those of Berglund and Brännäs, 2001, who found a positive effect on 5 sectors and a negative effect on 3). Its U-shaped

graph shows that the impact is highest in the smallest and largest municipalities. Consequently, we accept the hypotheses that the unemployed in these localities have a greater propensity to create their own projects. In the smallest municipalities this is due to the social networks between clients and suppliers in an environment in which entrepreneurs have a wide knowledge of local markets and the business opportunities they provide. And in the largest municipalities this is due to the larger markets, the consequential greater business opportunities and the possibility of hiring workers more cheaply if there is high unemployment.

7. Conclusions

Our results clearly show, as others have (Arauzo et al., 2002), that there is a close relationship between the creation and closure of manufacturing firms in Spain. As these results are preliminary, it is important analyse this relationship in greater detail.

It is important at least to analyse firm entries at a properly territorial level. It is not enough to study the industrial factors that determine business creation because territorial factors and, more specifically, geographical factors should also be considered. These issues can be analysed following a regional approach (as is usual) or an urban one (which is rare). The latter approach must cope with a lack of local data, but it would provide a better portrait of the factors determining the entry of firms in an industry. As our results show, local characteristics affect the formation of new firms, but more local data is needed to obtain more specific results. Clearly, public administrations should make a greater effort to generate these data and supply them to researchers because the effectiveness of entry policies depends on the data used in previous analyses. The importance of local factors on entry decisions is unclear, but what is clear is that local factors are important and that industrial policies should consider them.

Spatial policy must enhance local assets. Learning how to manage space is a major challenge for economic development. The economic efforts of local, regional and national governments to strengthen territorial development are therefore likely to become one of the main drivers of change, improving the legacy of places and the abilities of people, and creating greater opportunities for business.

Competitiveness has become the leitmotiv of economic geography and firms want to know where are the most attractive places to locate new firms. An important policy implication is that promotional efforts to attract new manufacturing firms to areas where entrances are low should solve certain structural territorial desequilibriums rather than simply offering financial aid, for instance, to newcomers (Ashcroft et al., 1991). However, for these policies it is important to know exactly what the territorial impact on firm entry is and what the determinants of firm dynamics are.

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