



Trabajo de Fin de Master

***Spatial issues on firm demography:
an analysis for Argentina***

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Septiembre de 2009

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Index

Abstract	2
Acknowledgments	3
Introduction	4
PART 1: LITERATURE REVIEW	
1.1 Presentation	6
1.2 Measurement and approaches	9
1.3 Firm Entry: literature review and empirical evidence	12
1.4 Firm Exit: literature review and empirical evidence	25
1.5 Independence, symmetry or simultaneity?	28
1.6 Survival: literature review and empirical evidence	31
1.7 Spatial issues on firm demography	33
PART 2: FUTURE RESEARCH	
2.1 Differences between developing and developed countries	45
2.2 Empirical research about firm demography in developing countries	47
2.3 Firm demography in Argentina	49
2.4 Lines of research and objectives	50
2.5 Statistical sources	54
2.6 Working plan	56
References	57
Annex 1	68

Abstract

Firm turnover (entry, exit and survival) inside manufacturing markets and the determinants of location of new ventures in a specific territory are relapsing subjects in the area of, respectively, Industrial Organization and Regional and Urban Economics. However, from beginnings of the nineties these subjects have recovered protagonism. The availability of better datasets, the advances in the Location Theories and Industrial Dynamics and the use of more sophisticated econometric tools (discrete choice, Poisson, panel data, etc.) help to explain the increasing interest of scholars in these subjects. This thesis project is set inside those perspectives and aims, on the one hand, to review the main theories and determinants that explain firm demography and, on the other hand, to explain the motivation and objectives for future research. The latter approaches some of the critical questions in this literature within the framework of a developing economy (Argentina). Using such empirical application constitutes a clear novelty inside an empirical literature centered in cases as Europe, North America or Japan, while very few empirical contributions do exist regarding countries out of these areas and, concretely, for developing countries.

Acknowledgments

I would like to thank to my supervisor, Josep María Arauzo, for his good advice, constructive criticism, support, and flexibility. To the Universitat Rovira i Virgili and the Universidad Nacional de Mar del Plata, for the financial assistance that let me take this Master. A special thank to the members of my research group in Facultad de Ciencias Económicas y Sociales, their academic and personal support and their many suggestions. I am also grateful to the members of the Observatorio de Empleo y Dinámica Empresarial, for their generosity and their willingness to work together.

And finally, but not least, thanks goes to my whole family, my friends and my boyfriend, who have been an important and indispensable source of encouragement, support, and so much more.

1. Introduction

The process by which new firms enter into industrial markets, either grow and survive or exit from the industry has crucial effects on economic growth and welfare. New businesses may have direct and indirect effects on industry economic performance. The former relates to the new jobs or the new production created by new units. The latter are qualitatively and quantitative more relevant and have to do with securing efficiency, stimulating productivity increase, reducing prices, creating new markets, stimulating innovation, increasing the variety of products and intensifying labor division¹. These benefits are not necessarily limited to the industry to which the start-up belongs, or to the region in which the entry occurs. Furthermore, Acs and Amorós (2008) find that entry of new firms is particularly relevant for developing economies, since innovative entrepreneurship leads to gap-filling and input-completing activities.

Recent literature indicate that barriers to entry facing small entrants are generally rather modest, and that entry of new firms does not seem to be substantially deterred in spite of high entry barriers (Acs and Audretsch, 1989a and 1989b; Audretsch, 1991). These observations suggest the existence of substantial “barriers to survival”, which may be more important than barriers to entry (Geroski, 1995). These three phenomena -entry, exit and survival- are extremely related. Entry of new companies may induce the closing of less efficient others, at the time that firms that decide to abandon the market leave behind niches of unsatisfied consumers that encourage new companies to enter. In this process, post entry performance and survival chances play a key role.

While considerable progress in the knowledge about new firm formation processes have been made, Fritsch *et al.* (2006) argue that determinants of success and failure of newly founded businesses are still rather unclear. In particular, they point out that the available studies do not systematically account for the regional dimension, despite regional factors play an important role and add significantly to the explanation of new business survival. Even more recently, Fritsch (2008) states there is not still sufficient knowledge about the ways in which new business formation shapes economic development, particularly what time period it takes until the effects become visible in empirical data. This issue is indeed complex because competitive impact of the entrepreneurial efforts differs between countries at the same level of development (Carree *et al.*, 2002), between countries at different stages of development (Wennekers *et al.*, 2005) and also among regions in a single country (Acs and Armington, 2004).

This thesis project aims, on the one hand, to review the main theories and determinants that

1 See the special issue of Small Business Economics of January 2008, in which several scholars analyze for different groups of countries how the entry of new firms affects labour market in the medium run. Among them there are empirical analysis for Germany (Fritsch and Mueller, 2008), Netherlands (van Stel and Suddle, 2008), UK (Mueller *et al.*, 2008), Portugal (Baptista *et al.*, 2008) and Spain (Arauzo *et al.*, 2008).

explain firm demography (Part 1) and, on the other hand, to explain the motivation and objectives for future research (Part 2). The latter will discuss firm demography in Argentina, over the period 2003-2008. It will include, as a central factor, the spatial issue, since Argentinian provinces differ significantly in terms of mean wage, skill manufacturing activity, economic growth and other factors that influence their territorial competitiveness. Thus, we should be able to identify the influences on the success, failure and survival of newly founded establishments that are specific to the particular industry, region and period of time. To our knowledge, such a study has not yet been done. This constitutes a clear novelty inside an empirical literature centered in cases as Europe, North America or Japan, while very few empirical contributions do exist regarding countries out of these areas and, concretely, for developing countries.

We begin Part 1 with a synthesis of the main theories of firm demography that are developed in next sections. Section 2 describes different forms of entry and exit, as well as the most widely used indicators of firm demography, stating their strong and weak points. In Sections 3 and 4, we briefly expose the main theories and determinants that explain, respectively, firm entry and exit processes. In Section 5 we discuss the relationship between both phenomena, and consider three alternative hypothesis that link them: independence, symmetry and simultaneity. A review of the main empirical evidence related is also done. Section 6 deals with firm survival, its determinants and the methods utilized. In Section 7 we discuss in detail the influence that regional and urban factors have in firm demography. Part 2 describes the objectives for future research. As firm demography has been fairly more documented in developed countries than in developing ones, in Section 1 we argue why results may differ between them. In Section 2, empirical research about firm demography in developing countries is exposed, while Section 3 briefly describes firm demography processes in the Argentinian recent years. In Section 4, aims and future lines of research are shown and, finally, Section 5 explains the available statistical sources.

PART 1: LITERATURE REVIEW

1.1. Presentation

The process by which new firms enter into industrial markets, either grow and survive or exit from the industry has fundamental effects on economic growth and welfare. New businesses may have direct and indirect effects on industry economic performance. The former relates to the new jobs or the new production created by new units at the start of business operations. These firms represent an entry of new capacities into the market and are, therefore, an essential element of the market process. However, the most important influence that the start-ups have on growth and employment occurs rather indirectly on the supply side. These indirect effects relate to; i) securing efficiency, stimulating productivity increase or low prices by contesting established market positions²; ii) accelerating structural change, generated by entries of new firms joined by exits of old-established ones; iii) creating new markets and stimulating innovation, since many radical innovations have been introduced by new firms, since incumbents may imitate innovations made by new firms or since incumbents are also stimulated to innovate themselves; iv) increasing the variety of products and problem solutions; v) intensifying labor division, which is stimulated by an increased variety of new supplies; vi) destroying jobs in the least competitive incumbent (Geroski, 1995; Fritsch, 2008; van Stel and Suddle, 2008)³. These effects are not necessarily limited to the industry to which the start-up belongs, or to the region in which the entry occurs and may be particularly important for developing countries (Acs and Amorós, 2008).

However, these effects may be overestimated. For example, Geroski (1995, p.437) concludes that: “entry is generally a poor substitute for active rivalry amongst incumbent firms in a market. Entry can be too slow, too small scale and too erratic to matter much in many circumstances. The pro-competitive effects of entry seem to be easy to exaggerate”. Acs *et al.* (1994) uncover a negative relationship between entrepreneurship and economic development, that persists after controlling for a number of other factors. Likewise, with regard to employment, if firms with relatively high productivity remain in the market while those with a low productivity reduce their output or exit, the market selection process may lead to a decline in employment, because fewer resources are needed in order to produce a given amount of goods and services at a higher productivity level (Fritsch, 2008). This author concludes that we still do not have sufficient knowledge about the ways in which new

2 Baumol (1982) argues that not only the actual entry but also the very possibility of an entry forces the incumbents to perform more efficiently.

3 Most of these indirect effects implicitly refer to Schumpeter’s idea of creative destruction, which he defines as the essential fact about capitalism. (Schumpeter, 1942, p.83: “The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets...” [This process] “incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one.”).

business formation shapes economic development, particularly what time period it takes until the effects become visible in empirical data.

Forty years ago, limit price hypothesis were dominant among the **theories of entry** and, consequently, entry barriers were the main factors used to explain market evolution. Attention focused almost exclusively on quantifying barriers to entry, rather than on measuring entry itself. This focus was related to static models, which interest centered on potential rather to actual entry (Bain, 1956; Bhagwati, 1970; Baumol, 1982). Besides, they were based on the assumption of a representative firm⁴. However, there have been some attempts to quantify the firm-turnover process. On the one hand, there are studies that covered a small number of industries (Mansfield, 1962; Carroll and Vogel, 1987). On the other hand, other studies attempt to measure the intensity of entry for a cross-section of industries. Nonetheless, they rely on data that were generated for other purposes and in many cases can not distinguish between entry and exit (Orr, 1974; Deutsch, 1975). As a result, they yield estimates of entry and exit that are imprecise or less than comprehensive (Baldwin and Gorecki, 1991).

In the 1970s and 1980s, models of strategic competition came into prominence. Researchers base on game theory, especially non cooperative games, to explain decisions of firms to enter, remain or exit a market, depending on their incentives. This new framework incorporate the dynamic dimension as well as the informative asymmetries (Tirole, 1990).

It is only in the early nineties that actual entry has attracted much attention in the empirical side of the industrial organization literature and that national data bases have been used. The use of more sophisticated econometric tools -discrete choice, Poisson, panel data, etc.- also helps to explain the increasing interest of scholars in these subjects. Many empirical studies about entry are developed and summarized in Geroski (1995). The theoretical models related to recent empirical studies may be divided into three groups: a) learning by doing models, such as Jovanovic's (1982), Frank's (1988) and Ericson and Pakes' (1989) b) evolutionary models which suppose an imperfect knowledge of the environment, namely Nelson and Winter (1982) and Audretsch (1995b) and c) theories of industry life cycle (Agarwal and Gort, 1996; Klepper, 1996).

The main factors used to explain entry are: firm size and age, barriers to entry -product differentiation, absolute cost advantages, scale economies, vertical integration, limit pricing, excess capacity, strategic use of distribution systems and predatory prices-, capital requirements, research and development (R+D) intensity, past profit rate, past rate of industry growth, level of risk, stage of life industry cycle, market concentration and technological regime.

4 The argument in neoclassical economic theory is not that firms are all alike. Rather, the position is that differences are not discretionary, but reflect differences in the contexts in which firms operate (Nelson, 1991). Thus, firms are forced to be different. In contrast, evolutionary theory rejects the concept of representative firm. It proposes that differences between firms are discretionary and they manifest in their strategy, their structure and their core capabilities.

In regard to **the exiting process**, despite its relevance, there are relatively less studies referred to firm exit than firm entry. This phenomena is analyzed since the late sixties (Marcus, 1967) and the greatest impediment to measuring the shares of exiting establishments is the lack of longitudinal data bases that identify the actual closure date of businesses. In addition, studies about firm exit may be less consistent, because of the time that passes by between the exit decision and the actual exit - because of the intention of recovering the sunk costs-. The main factors behind the exit process mentioned in the literature are: the level of profits, barriers to exit -scale economies and sunk costs, such as advertising, R+D investments or capital intensity-, firm age and size, industry growth, technological regime, stage of the industry life cycle, degree of industry concentration, gross entry and non-economic factors. The methods and techniques are similar to the ones used in firm entry research.

On the other hand, **firm survival** has been first dealt with as a side issue to firm growth, since only surviving firms are able to grow⁵. Later, it also becomes a side issue in the entry and exit literature, survival being the inevitable in-between stage. If entry barriers could be more effectively justified as barriers to survival, this would help to reconcile the repeated occurrence of suboptimal entry with the presence of high entry barriers, and the often recorded positive correlation between entry and exit rates across industries (Geroski, 1995). Finally, in the 1990s survival establishes its independent position in the literature, giving rise to a considerable amount of empirical research. Audretsch (1991), essentially deploying explanatory variables defined at the industry level, finds that industry concentration, capital intensity and economies of scale all have a negative effect on new firm survival, thus supporting the idea that entry barriers are more effective as barriers to survival. In contrast, industry growth reduces the cost disadvantage, enhancing survival prospects. As concentrating the analysis entirely at the industry level is recognized as a limitation, firm-specific variables are subsequently introduced: start-up size, firm growth, stage of industry life-cycle, capital intensity, technology employed, industry's innovation rate, financial structure and ownership status. In the middle nineties, macroeconomic conditions, firm strategy and individual characteristics of the entrepreneurs are also considered.

Regional factors have been more recently included⁶ as determinants of firm demography. About twenty years ago, a substantial literature in regional economics tried to identify the geographic specific characteristics which induce new-firm start ups. However, this literature has produced a number of ambiguous results (Audretsch and Fritsch, 1999). These authors show that this owes to the omission that the link between geographic specific factors and the propensity to start new firms varies from industry to industry. Arauzo *et al.* (2010) find that the basic analytical framework has remained

5 Joint estimations of survival and growth have been used to overcome the selectivity-bias problem.

6 See for example the collection of country studies included in the special issue of *Regional Studies on Regional Variations in New Firm Formation*, edited by Paul Reynolds *et al.* (1994a), as well as Audretsch and Fritsch (1994a,b) and Fritsch (1992) for Germany, and the survey by Storey (1991).

unaltered since the early contributions of the 1980's, while, in contrast, there have advances in the quality of the data and in the econometric modeling. There are basically two ways to assess which factors affect entry decision into an specific location: i) examining location decisions from the viewpoint of the agent that makes the choice or, alternatively, ii) assessing the issue from the viewpoint of the chosen territory. In the former case, factors related to the agent taking the decision - size, sector, etc.- and those related to the set of alternatives -population, infrastructures, etc.- are considered and the unit of analysis is the establishment. In the latter, the unit of analysis is geographical -municipality, city, province, region, etc.- and the main objective is to analyze which characteristics of a territory affect the average number of new concerns that are created therein (Arauzo *et al.*, 2010). There are also two alternative geographical units considered: the regional and the urban ones. The former refers to broader areas like provinces or regions where there are multiple relationships among firms, public institutions and individuals, while the later refers to smaller units (usually cities) where density of economic activity is considerably higher.

1.2. Measurements and approaches

There is no an unique concept of entry and exit and there are also different indicators to describe processes of firm demography. At least five different forms of entry can be distinguished: i) newly created firms; ii) entry by an existing firm that builds a new plant in the industry; iii) entry by an existing firm that purchases a plant or firm already existing in the industry; iv) entry by an existing firm that alters the product mix in an existing plant; v) entry by a foreign-owned firm in one of the above ways (Mueller, 1991, in Audretsch, 1995a)⁷. There are different forms of exit as well: i) voluntarily exit; ii) bankruptcy; iii) merger; iv) purchase by another firm.

In particular, Foreign Direct Investment (FDI) is specially relevant in firm demography processes of developing countries. Foreign firms may entry mainly through four kinds of modes: greenfield investments, acquisitions, mergers and joint ventures. In the former case, the transaction involves mainly newly created assets that come under control of the foreign firms⁸, while in the second and third cases, the transaction implies just a transfer of existing assets from local firms - mergers occur when the assets and operation of firms from different countries are combined to establish a new legal identity, and acquisitions occur when the control of assets and operations is

7 Bain (1956) defines an entry as the combination of two events: a) the establishment of an independent legal entity, new to the industry, as a producer therein; and b) the introduction by the new firm of physical production capacity that was not used previously for production in the industry. This definition excludes the acquisition of existing producing capacity (changes of ownership) and the expansion of capacity by an established firm.

8 However, greenfield investment does not necessarily reflect the acquisition of new fixed assets, since it includes all financial transfers from a multinational's headquarters to its subsidiary -and back-. (Calderón *et al.*, 2004)

transferred from a local (affiliate) to a foreign company⁹-. The latter mode involves newly created assets which are financed and controlled jointly by foreign and domestic firms.

The causes of the FDI may be divided into push factors -declining real interest rates in industrial economies- and pull factors -the characteristics of investment environment in developing countries, the decision to privatize state enterprises, etc-. While the theoretical literature points out that FDI may boost growth, both by raising aggregate investment and through technological spillovers, the empirical literature shows considerable disagreement, both at firm and at macroeconomic level¹⁰.

Thus, a critical point is the role of foreign companies in local firm demography and performance. Despite the integration into global production networks or global value chains (GVC) has been a key catching-up mechanism for several developing countries, this integration is not homogeneous. The GVC approach¹¹ explains the reasons for this heterogeneity. As indicated by Kosacoff and López (2008), being part of a CGV is not, *a priori*, a positive aspect from the standpoint of long-term firm competitiveness or countries' economic development. Such participation must be accompanied by a set of factors that stimulate the upgrading of local firms and enable them to absorb the potential benefits of the relationships within these chains. Amsdem *et al.* (2001) argue that different contexts lead to different possibilities of upgrading. Thus, in countries like Singapore there was a transition from OEMs contracts (original equipment manufacturer), where the local firm aims to low costs and produces a good entirely designed by the transnational firm, to an ODM scheme (original design manufacturer), where even though the basic design of the product is still done by the transnational firm, local companies integrate parts and components and perform some design, in order to lower costs and reduce time to market. Finally, in the OBM contracts (original brand manufacturer) the local firm not only deals with the design as a whole but also with marketing.

However, this processes are not automatic: the upgrading possibilities depends i) on the type of chain governance¹² in which firms participate, and ii) on the local conditions. On the one hand, Humphrey and Schmitz (2000) argue that in chains where leaders focus on knowledge-intensive activities, and only transmit the technical requirements to their suppliers (quasi-hierarchy), the exchange of intangible assets that stimulates the learning process of local firms is limited (and thus the types of upgrading observed are more related to products and processes). In contrast, in horizontal structures closest to networks, cooperative relations between firms are common. On the other hand,

9 In Latin America, the rise in Mergers and Acquisitions (M&A) in the 90s is largely driven by privatization of public enterprises. Calderón *et al.* (2004) mention that, in this region, M&A accounted for over 50% of total FDI inflows in 2001-02 and that mergers represent only 3% of world M&A in 1999.

10 Calderón *et al.* (2004) pp. 3-4, expose several studies that account for the evidence of FDI impact at both levels.

11 Main references of this literature include: Gereffi (1994), Kaplinsky (1998), Humphrey and Schmitz (2000), Gereffi and Kaplinsky (2001) and Gereffi *et al.* (2005).

12 Humphrey and Schmitz (2000) distinguish different types of chains, focusing on the way they are coordinated. They suggest that there is a continuum from arm's-length market relationships through to hierarchical governance (vertical integration). In between, there are networks, that bring together partners with complementary competences, and quasi hierarchy, in which there is asymmetry of competence and power in favour of one party.

upgrading depends also on local conditions: macroeconomic and institutional stability, public policies, human capital, clusters, technological and absorptive capabilities of domestic firms, the characteristics of national systems of innovation and the availability of infrastructure, among other factors (Humphrey and Schmitz, 2000; Gereffi *et al.* 2005; Giuliani *et al.* 2005; Morrison *et al.* 2006).

There are also several measures of entry and exit, and results are not neutral to them. Number of entries and exits have to be normalized in order to make comparisons between different areas. So, we may use several approaches: a) the one related to labor market, if the denominator used to normalize is the number of workers or active population, b) the one related to the population, if the denominator is total population, c) and the ecological approach, if the divisor is the total number of firms.

The first approach is based on the assumption that new firms are created by people living in the same area, while the second one supposes entrepreneurs found companies inside the labor market from which they come and in which they have a previous experience as employees (Audretsch and Fritsch, 1994b). The ecological approach is the most widely used and it is related to the idea that new firms arise from the incumbents or as a result of them¹³ (spin outs). According to it, the **gross entry rate** is defined as the number of new firms divided by the total number of incumbent and entrant firms producing in that year¹⁴. However, this rate does not account for the mean firm size, nor the new firms or the incumbents. The solution consists in dis-aggregating the entry rate by size, in order to determine the entry rate in each stratum. This enables us to compare between areas dominated by larger firms or by small and medium establishments.

Garofoli (1991) suggests some critics against this indicator. In the first instance, there are structural differences between new enterprises -generally small- and incumbents. There are also structural differences between establishments of different economic sectors or regions, and the comparisons between them may tend to misleading results. In addition, this indicator assumes a casual relationship between stock of firms and birth. Moreover, as the denominator is usually small -specially at a sectoral or regional level-, entry rate may be large, even though the number of entries is low.

Besides, Ashcroft *et al.* (1991) mention that this indicator mirrors the previous entry rate, so that, if a region had a low entry rate in the past, it would show an artificial rise in the current entry rate. Finally, Audretsch (1995a) states that measuring the change in the number of firms does not account for enterprises that exited from the industry during the relevant period.

Symmetrically, the **gross exit rate** is defined as the number of exits divided by the total

13 Empirical evidence about the importance of small firms as “incubators” for new firm founders in the manufacturing sector is found in Fothergill and Gudgin (1982), and of large firms in business and professional services in Keeble *et al.* (1992).

14 The concepts of “new” and “incumbent” establishments do not lend themselves to obvious measurement either. A new establishment may be defined alternatively as an establishment younger than one, two or four years old. By contrast, incumbent firms are defined as those firms more than ten or fifteen years old, or alternatively as the total number of firms in the current period. All these definitions are certainly arbitrary (Audretsch, 1995a).

number of incumbent and entrant firms producing in that year. Besides, the most common measure of entry used in studies attempting to empirically identify the determinants of entry has been the **net entry rate**, that is, the change in the number of firms over a given period (Audretsch, 1995a). It equals the difference between the gross entry rate and gross exit rate. The sum of these two rates gives the **rate of rotation or firm turnover**, which is a global measure about the flows of entry and exit. In addition, Audretsch (1995a, p.157) introduces a measure of **relative exit by ages**, defined as the sum of the number of exiting establishments between the ages of t1 and t2, over the total number of exiting establishments. The rate may be also calculated by economic sectors.

An alternative indicator is the **rate of entry penetration**, that is the gross sales/employees/investment by entrants divided by total industry sales/employees/investment. At last, the **rate of volatility** takes into account structural factors, such as technology, specific assets, R+D investment, etc., and has an inverse relationship with the level of entry and exit barriers. It is defined as the difference between the rate of rotation and the absolute value of the net entry rate.

1.3. Firm entry: literature review and empirical evidence

In this Section, we expose a synthesis of the main theories and determinants that explain firm entry and exit processes. We begin with traditional theories, based on limit price hypothesis, and afterward, more recent theories are explained: a) learning by doing models, b) evolutionary models which suppose an imperfect knowledge of the environment¹⁵ and c) industry life cycle models. In every case, we explain the basic model, we expose the main factors used to explain entry and we review the empirical evidence. Later on, we synthesize the stylized facts about entry summed up by Geroski (1995) and others. Finally, we analyze the motives to start a firm, both from an entrepreneurship and an industrial organization perspective (Shapiro, 1983).

Traditional theories are based on limit price theory and link entry rate to industry profitability, growth and structural barriers to entry. In spite of the numerous studies developed under this framework, many of the questions about the process of entry remained unanswered (Audretsch, 1995a) and the resulting empirical evidence was ambiguous and not conclusive. So that, in the nineties, additional theories which recognize firm heterogeneity and dynamic issues are considered. The availability of better national data bases and the use of more sophisticated econometric tools let introduce another variables as well.

The traditional theories

¹⁵ We do not expose the characteristics of models of strategic competition, developed in the 1970s and 1980s, because of their theoretical nature and the relatively less empirical studies related.

As initial studies about entry are based on limit price theory, entry barriers are the main factors used by these authors to explain market evolution. Both Bain (1949) and Sylos (Modigliani, 1958) describe the entry limiting price as the maximum to which price can be raised above the competitive level without attracting entry. Since the limit price is function of the level of entry barriers and it implies a certain rate of return, cross section differences in long run profit rates can be, at least partly, attributed to differences in the level of entry barriers. Thus, attention focuses almost exclusively on quantifying barriers to entry, rather than on measuring entry itself. For instance, Bain (1956) examines 20 United States manufacturing industries and concludes that the most significant barriers to entry are product differentiation, economies of scale in plant or firm and control of patents or scarce resources, respectively¹⁶. Other econometric investigations of entry barriers in the sixties (Comanor and Wilson, 1967; Miller, 1969) are also indirect tests. They regress the profit rate, rather than entry, on those structural characteristics considered to be entry barriers.

Despite the emphasis on potential rather than actual entry, there have been some attempts to quantify the firm-turnover process. On the one hand there are studies that cover a small number of industries (Mansfield, 1962; Carroll and Vogel, 1987). On the other hand, there are other papers that measure the intensity of entry for a cross-section of industries. Many of these studies (Orr, 1974; Deutsch, 1975) have had to rely on data that were generated for other purposes, have only the gross number of firms or cannot distinguish between entry and exit and, consequently, yield estimates of entry and exit that are imprecise or less than comprehensive (Baldwin and Gorecki, 1991).

Among these early studies that account for variations in entry in strict sense, one of the most relevant is Orr's (1974). He presumes that entry is a positive function of the difference between observed and entry limiting profit rates, and a positive function of the expected rate of growth of industry output (Q):

$$E = f(\pi_p - \pi^*, Q) \quad [1]$$

where π_p is the past industry profit rate -proxy of observed profit rate- and π^* is the long run profit rate predicted for this industry on the basis of the level of entry barriers. This rate depends on capital requirements, advertising intensity, research and development intensity, market share of minimum effective size (MES) plant, risk and concentration. Q is the expected rate of growth of industry output.

It is only twenty years ago that actual entry has attracted much attention in the empirical side of the industrial organization literature. Studies using national data bases have emerged in the early nineties as well. At that time, Geroski (1991b) extends Orr's model, assuming that entry is a function of the incentives to enter relative to the level of entry barriers:

¹⁶ Mann's study (1966) on 30 of the United States manufacturing industries, does not examine the relative importance of the various entry barriers and Mansfield's (1962) sample is limited to four industries. Capital requirements is the only barrier considered.

$$E = \beta (\pi^e - F) + \mu \quad [2]$$

where E is entry into some industry at a period of time, π^e is expected post-entry profits, F is the costs of entry and β is a parameter which measures the speed of entry in response to profitable opportunities¹⁷. F measures the level of profits at which entry is cut off, the level of “limit profits” and [2] is often used to generate estimates of the height of barriers to entry.

In other words, the main determinants of entry used in the initial models include: i) current, past or expected profit rate, ii) barriers to entry, iii) current, past or expected rate of growth of industry output, iv) industry concentration and v) risk¹⁸. In the next paragraphs we briefly describe each one of them.

With regard to the first determinant, from the empirical literature on entry surveyed by Geroski (1995) emerge that entry seems to be slow to react to high **profit rates**. That is, most of the estimates of β are rather small and imprecisely measured. This suggests that differences in profits between industries would have to be much larger than we observe them to be to account for observed inter-industry differences in entry. Geroski (1995) says that it may be a consequence of mis-measuring either π^e or F , or of specification error, since most studies assume that β is the same in all industries. A small amount of work using extrapolative or rational expectations predictors of π^e produce much larger and more precise estimates of β .

Some studies estimate that, on average, incumbents are able to maintain prices above their average costs in the long run, without attracting serious competition from new entrant firms. Besides, the height of these limit profits -the value of π^e at which E goes to zero in equation [1]- varies considerable between industries. These differences in profitability between industries are extremely stable and persistent, meaning that most of the variation in profitability across industries and over time is “between” industry variation. On the other hand, differences in entry rates between industries are unstable and do not persist for very long, meaning that entry exhibits far more “within” industry variation than profits (Geroski, 1995). Consequently, to explain profitability, one needs to identify stable structural features of markets that vary across industries but not over time, such as barriers to entry. Conversely, to explain entry, one needs to identify much more transitory, time-varying features that do not necessarily differ across industries.

Orr (1974) introduces the average level of the **past industry profit rate** as a measure of the observed profit rate. The profit rate is defined as the sum of net income and interest payments over

17 Expected post-entry profits have been proxied by lagged profitability or by some determinants of profitability, such as current period growth rates or industry concentration. F has usually been proxied as a linear function of a number of observable proxies for barriers of entry, like capital intensity, advertising intensity or minimum efficient scale.

18 Other determinants of entry omitted by Orr (1974) because of the difficulty of quantifying include: the slope of the long run average cost curve generated by plants below MES, the impact of entry on factor prices, the degree of excess productive capacity, industry demand elasticities, marketing arrangements (franchising), particular government regulations and programs or purchasing policies.

total assets. However, these profits may be an inadequate proxy for the profit rate an entrant could expect to earn, because it may be due to rents from unreproducible factors or temporary market conditions. Additional problems arise if firms within the same industry as well as across industries employ different accounting concepts and procedures.

The level of industry profitability was found to have only a weak positive impact on entry in studies by Orr (1974) and Deutsch (1984), whereas Khemani and Shapiro (1986) find past profits to be a strong determinant of entry¹⁹. And five of the six country studies contained in Geroski and Schwalbach (1991) find a positive link between industry profitability and entry.

The main **entry barriers** analyzed in the literature are: product differentiation, absolute cost advantages, scale economies -minimum effective size-, vertical integration, strategic barriers -limit pricing, excess capacity, strategic use of distribution systems and predatory prices-, research and development intensity and legal barriers.

1. The first three ones are initially analyzed by Bain (1956). **Product differentiation** forces the entrant to make extra outlays in order to offset the “goodwill” assets of the incumbent firms - for example, by making higher sales promotion outlays or accepting a lower price-. Advertising outlays are made not only to raise the limit price and shift outward the advertiser’s own demand curve, but also to decrease the elasticity of demand facing the new firm and shrink its demand curve. Examples include the proliferation of brands to fill the various niches in consumer’s preference spaces and leave no viable ones for entrants, and the use of restrictive arrangements with the distribution sector that leave the entrant with less effective or economical channels (Caves and Porter, 1977). This barrier may be proxied by advertising intensity.
2. Established firms may have **absolute cost advantages** over potential entrant firms. In particular: a) incumbents can have price or other advantages over entrants in purchasing or securing productive factors or investible funds, for example through resource ownership, qualified personnel or agreements with suppliers, b) entry of an added firm may have effects on the going level of the factors prices, or c) established firms may have preferred access to productive techniques, for instance, through patents or know-how. **Initial capital requirements** may be included in this category as well.
3. Significant **economies to scale** tend to impede entry, because the larger the minimum effective size (MES), the more an entrant’s output will depress industry price, given any elasticity of industry demand²⁰. Thus, larger MES increase the ability of existing firms to raise price

19 While Orr (1974) use net entry as the dependent variable, the dependent variable in Khemani and Shapiro (1986) is *de novo* gross plant entry, net of exit, plant openings by incumbents, mergers and diversification.

20 This is only one aspect of economies of scale in production. The other aspect, the degree to which average production costs are elevated at lower output levels, could not be included by Orr due to data limitations.

without making entry profitable. This is the fundamental barrier to entry considered by Sylos (Modigliani, 1958). MES is defined as the smallest plant size in a given industry consistent with profitable operations in a year of normal economic activity and it is frequently measured by the median plant size of the industry. **Capital requirements**, that is the cost of fixed capital required to establish a plant of minimally effective size, may be also included in this category.

These barriers may be also interrelated: investments that augment product differentiation and absolute cost barriers to entry can either increase the fixity of costs or shift the production function to display greater diseconomies of small scale (Caves and Porter, 1977). Either effect impairs the cost position of the small firm -entrant or incumbent- relative to the large one.

4. Caves and Porter (1977) consider also **vertical integration** as another barrier-raising investment, although it cuts across the others. When going firms integrate, they pose a dilemma for the newcomer considering entry at either stage. If he enters unintegrated, he faces an extra uncertainty, and if he enters integrated, he faces an augmented capital cost entry barrier. That is, either his mean expected profit rate falls, or its variance increases.
5. According to the **strategy of limit pricing**, the incumbent chooses higher of monopoly output levels pre-entry in the hope of deterring entrants²¹. That is, the established firm fixes -or threatens to fix- a price so low that the entrant cannot afford the entry costs. This strategy is narrowly related with the height of the entry barriers, since the higher the barriers, the higher may be the price.
6. **Excess capacity** represents an entry-discouraging investment. Unused production capacity makes credible a threat of price warfare against entrant firms. Although buying off the entrant is both less illegal and less costly, it increases the likelihood of future entry (Caves and Porter, 1977). Another type of investments in excess capacity is the acquisition by going firms of control over scarce deposits of an input resource or **enlarge a firm's retaliatory power**.
7. The strategy of **predatory prices** may be carried out by an incumbent which reduces its prices in an attempt to destroy its rivals or to deter new entry.
8. The chief component of the barrier of **research and development (R+D) intensity** is the extent of economies of scale in the R+D process. The second major factor is the accumulation of patents and know-how on the part of incumbent firms (Mueller and Tilton, 1969).
9. There may be also **legal barriers**, which are exogenous and block the entry of new firms.

Despite econometric estimates suggest that entry barriers are high (Geroski, 1995), not

21 If economies of scale require entrants to achieve at least a minimum market share, and if they believe that incumbents will not change their pre-entry output levels post-entry (the Sylos Postulate), then the incumbent will choose a pre-entry output level that ensure non positive post-entry profits for the entrant. The Sylos Postulate states that no matters the production capacity of the incumbent, the new firm expects that after his entry, the incumbent will use his whole capacity.

all are used as often or in the same situations. The response by incumbents to entry is selective and they attack entrants in a variety of ways using a variety of tools²², but it may be hard to distinguish empirically one attitude from another. For example, an established firm may use the strategy of limit pricing, and, alternatively, it may also ignore entrants, at least until they are well established. The latter makes sense if one consider that most entry attempts are doomed to failure and most entrants take five or ten years before they are able to compete with the incumbents. The hypothesis of no acting predicts that incumbents will not change their output or advertising post-entry from levels that prevail pre-entry. The problem is that it is hard to distinguish empirically this attitude from the strategy of limit pricing, which is a fairly aggressive response to entry, that occurs prior to entry.

Caves and Porter (1977) argue that none of the structural sources of entry barriers, advanced by Bain as purely exogenous, is immune to change through incumbent's actions. These actions affect both entrant's conjectures about industry conditions following his entry and the barriers to entry. Thus, the entry barriers are partly structural but at least partly endogenous.

Entry barriers may also be seen as a collective capital good, since an investment in entry deterrence generally protects not just the investor but his oligopolistic rivals as well. That is, if entry barriers generate joint profits for the going firms, without collusion incumbent firms will invest less in entry barriers than the amount that maximizes joint monopoly profits. Thus, it raises special problems for the form and the extent of collusion.

The evidence suggests that entry is apparently not substantially deterred or even deterred at all in **capital intensive** industries in which scale economies play an important role²³ (Austin and Rosebaum, 1990; Siegfried and Evans, 1992). Acs and Audretsch (1990, 1989a and 1989b) find that even small firms are not significantly deterred from entering industries that are relatively capital intensive. Besides, other empirical studies show that **predatory prices** and the **strategic use of capacity** are used rather infrequently by incumbents to deter entry²⁴. As a consequence, entry seems to have only modest effects on average industry price-cost margins (Geroski, 1995). Instead, the **strategic use of distribution systems**, signing long term contracts with buyers, advertising, R+D, patent protection, learning curve strategies, space packing (for instance, filling all viable market niches with a

22 See Geroski (1991b), chapters 4 and 5 for a survey.

23 It contrasts with Bain (1956) who finds that the second most important barriers are economies of scale in plant or firm.

24 Geroski (1995) mentions some work that has tried to test the presence of limiting pricing -which in general has produce ambiguous results-: Hannan (1979); Masson and Shaanan (1982); Sengupta *et al.* (1983); Yamawaki (1985); Lieberman (1988). He argues that studies of the strategic use of excess capacity to block entry have also produced weak evidence on its importance: Lieberman (1987); Hilke (1984); Masson and Shaanan (1986); Reynolds (1986).

customized version of the basic product) or hiding profits are considered more important and more frequently used. These strategies may differ between countries and depend on the type of market defended -new markets or established ones- (Singh *et al.*, 1991; Cubbin and Domberger, 1988; Biggadike, 1976). This suggests, accordingly to Bain (1956), that **advertising** may be an important barrier to entry, since heavy advertising makes entry more difficult for many new firms.

Another variable used to measure the incentive to enter is the **past rate of growth of industry product**, since past industry profit rate may not be a fully adequate proxy for the profit rate expected by the entrant. It is also a proxy for the expected rate of growth of industry output. *Ceteris paribus*, the higher the rate of growth of industry output, the less an entrant's supply will depress industry price and output. Similarly, the more new customers coming into the market, the lower the selling expense of attracting customers. Besides, higher rates of growth enable incumbent firms to raise prices and to induce more entry, or else raise expectations about future profits. Entry rates are found to be positively influenced by industry growth rates (Geroski and Schwalbach, 1991).

Besides, in highly **concentrated industries**, the potential entrant must consider the possibility that the established firms may collude to thwart his entry. In empirical studies, industry concentration levels display mixed and often rather imprecisely estimated effects on entry (Geroski, 1995). This is surprising because most scholars expect to uncover a negative correlation between concentration and entry.

Finally, **risk** may be measured ideally as the standard deviation of firm profit rates across the industry, as well as the standard deviation of the firm profit rate over time. For any expected profit rate, as the deviation increases the incentive to enter decreases.

The recent theories

Little consensus has emerged of the studies trying to link industry profitability, growth and structural barriers to entry rate (Geroski, 1995). Empirical evidence in support of the traditional model is ambiguous and studies developed under this framework could not answer many of the questions about the process of entry (Audretsch, 1995a). Perhaps one reason for this trouble is the inherently static model used to capture an inherently dynamic process (Neumann, 1993, pp. 593-594). In addition, entry rates are hard to explain using conventional measures of profitability and entry barriers. Geroski (1995) mentions that only a very modest amount of the variation in entry across industries in a single year has been accounted for by use of a model like [2]. Furthermore, the degree of explanation achieved in studies of entry over time or by using panel data models or autoregressive models of entry do not provide much of an improved fit. Transitory variations in the unobserved factors summarized by μ seem to account for far more of the variation in entry than variations in

observables, such as π^e or F .

So that, in the nineties, jointly with the availability of better national data bases and the use of more sophisticated econometric tools -discrete choice, Poisson, panel data, etc.-, other variables are considered. Besides, firm heterogeneity is recognized, since just imitating incumbents is almost certainly doomed to failure. Generally, an entrant can only hope to succeed if he employs either a new technology or offers a new product, or both. Thus, the framework needs to be enlarged by putting it into a dynamic setting with heterogeneous agents²⁵.

Three groups of models can be distinguished in this period: a) learning by doing models, such as Jovanovic's (1982), Frank's (1988) and Ericson and Pakes' (1989), b) evolutionary models which suppose an imperfect knowledge of the environment, namely Nelson and Winter (1982) and Audretsch (1995a and 1995b) and c) theories of industry life cycle (Klepper and Graddy, 1990; Gort and Klepper, 1982).

Among the **learning by doing models**, is the one proposed by Jovanovic (1982). He develops a model that gives rise to entry, growth and exit behavior that agrees with the empirical evidence -that smaller firms grow faster and are more likely to fail than large ones-. The model deals with an industry which product is homogeneous and which costs are random. The potential entrant is assumed to know the mean and standard deviation of all firms' costs but not its own mean expectation. Upon paying an entry fee, it starts to receive noisy information on its true cost level, which in every period might induce it to expand, contract or even exit. Efficient firms grow and survive, while the inefficient decline and fail. As firms learn about their efficiency as they operate in the industry, this model is known as "passive learning model".

Similarly, Frank (1988) shows, in his basic model, a risk-neutral entrepreneur who takes all prices as given, but is unsure of his or her own talent for running a firm. He will enter only if expected profits at least match the opportunity costs. Each period that the firm survives, it acquires more information concerning true productivity. Using this new information, the entrepreneur revises his beliefs concerning expected future profits. If the new information implies very poor future productivity, then the entrepreneur will choose to leave the industry. There are three main differences between Frank's and Jovanovic's models: i) in the former the concern is more with the individual firm, while in the latter the concern is more with the aggregate industry; ii) in Frank's model, the scale of operation affect the rate of entrepreneurial learning, so that new firms enter at scales of operation different from one another. More optimistic entrepreneurs will enter on a larger scale; iii) Frank supposes firms are fully rational Bayesian optimizers.

Pakes and Ericson (1989) also consider a similar model, that allows for heterogeneity among

25 In the traditional theory, outputs and inputs in an industry are assumed to be homogeneous. That is, the entry of new firms is about business as usual (Audretsch, 1995a).

firms, firm-specific sources of uncertainty, and discrete outcomes (exit and/or entry). It assumes that the firm knows the current value of the parameter that determines the distribution of its profits, and that the value of that profitability parameter changes over time in response to stochastic firm's own investments. Firms act so as to maximize the expected discounted value of future net cash flow and can invest to improve the value of the parameter which determines the distribution of its profits, for example, exploring and developing alternative market niches which may, or may not, prove profitable. That is why this model is known as “active exploration” or “active learning”. In this model the distribution of futures states is determined entirely by the current state and the optimal investment policy. It is, therefore, independent of the age of the firm *per se*.

Various empirical papers have attempted to identify passive and active learning processes. For example, Pakes and Ericson (1998) claim that US manufacturing firms are more consistent with the active learning model whilst retailing firms are more consistent with the passive learning model.

Among the first evolutionary **models which suppose an imperfect knowledge of the environment** is Nelson and Winter's (1982). Their theory emphasizes the tendency for the most profitable firms to drive the less profitable ones out of the business. However, they do not focus the analysis on hypothetical states of industry equilibrium, in which all the unprofitable firms no longer are in the industry and the profitable ones are at their desired size. Their modeling approach does not use the maximization calculus to derive equations characterizing the behavior of firms. Instead, they model firms as simply having, at any given time, certain capabilities and decision rules. Over time these capabilities and rules are modified as a result of deliberate problem-solving efforts and random events. And over time, the economic analogue to natural selection operates as the market determines which firms are profitable and which are not, and tends to winnow out the latter.

Audretsch (1995a and 1995b) examines why new firm star up activity varies so greatly across industries and focus on the underlying technological regimes. Instead of asking “Why do firms enter an industry?” he wonders “Why do economic agents start new firms?”. And he argues that they do so in order to best appropriate the expected value of new economic knowledge. Asymmetries in new economic knowledge (business ideas) combined with high costs of transacting lead to divergences in beliefs about potential innovations as follows: since new economic knowledge is not only imperfect but also asymmetric, agents must decide whether to pursue their anticipated innovation within the boundaries of an incumbent enterprise or start a new one. If the expected value of new economic knowledge diverges greatly enough across economic agents, they will have a greater incentive to start new firms. And because the degree of asymmetries and transaction costs vary from industry to industry, the propensity for people to start firms should correspondingly also vary across industries. Focusing on the individual possessing uncertain knowledge leads to an additional economic role of the new entrant -not just to equilibrate the market by increasing the supply of the product already

produced by the incumbent firms- but rather by doing something different and thereby serving as an agent of change.

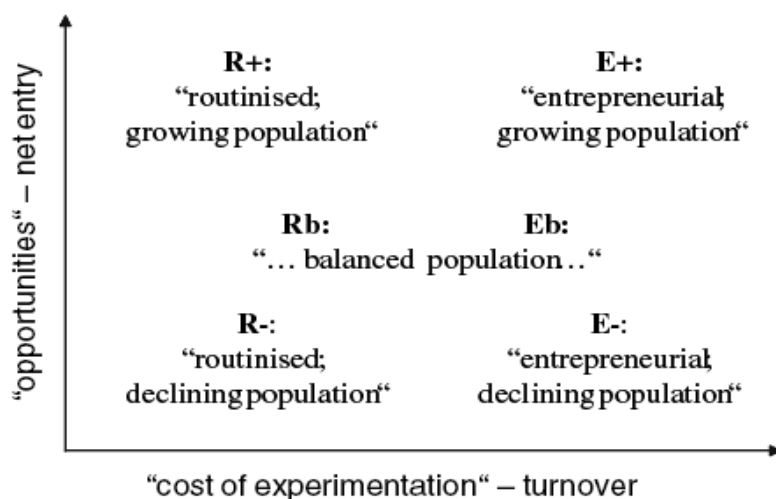
He also states that the propensity for new firms to be started will be shaped by the underlying technological regime, that is the knowledge conditions subjacent the industry (Nelson and Winter, 1974 and 1982). In some industries, new economic knowledge generating innovative activity tends to be relatively routine and can be processed within the context of incumbent firms. This corresponds to the “routinized regime”, that is, one favorable to innovative activity by established firms and unfavorable to innovative entry (Winter, 1984). In other industries, innovations tend to come from knowledge that is not of a routine nature and therefore tends to be rejected by the hierarchical bureaucracies of incumbent firms. This corresponds to the “entrepreneurial regime”²⁶. He concludes and empirically demonstrates that start-up of new firms is more prevalent in industries characterized by a greater extent of information asymmetries, as measured by the entrepreneurial regime, where small firms have an innovative advantage over their larger counterparts²⁷.

More recently, Peneder (2008) proposes a new sectoral taxonomy and discriminates between entrepreneurial and routinized regimes by a sector’s relative exposure to competitive entry. He argues that potential entrepreneurs have to weigh up two factors: the opportunity and the cost of experimentation. The first one is composed of the incentives to participate in the market, such as actual price-cost margins, potential for future growth, or the appropriability of novel ideas. The second determinant consist of the initial expenditures on starting the business as well as the cost incurred when the venture fails. As the former is proxied by net entry, the latter is proxied by the rate of firm turnover, since high turnover indicates relatively low barriers to entry and exit and thus low cost of experimentation. Thus, he classifies industries according to both factors and finds five types of regimes exposed in Figure 1.

FIGURE 1: AN INDUCTIVE TYPOLOGY OF ROUTINISED VERSUS ENTREPRENEURIAL MARKETS

26 Empirical evidence supporting the existence of these two distinct regimes includes: Acs and Audretsch (1987, 1988 and 1990).

27 An entrepreneurial regime is that one in which the ratio of the small firm innovation rate to the total innovation is particularly high. Conversely, a routinized regime is that one in which that ratio is particularly low.



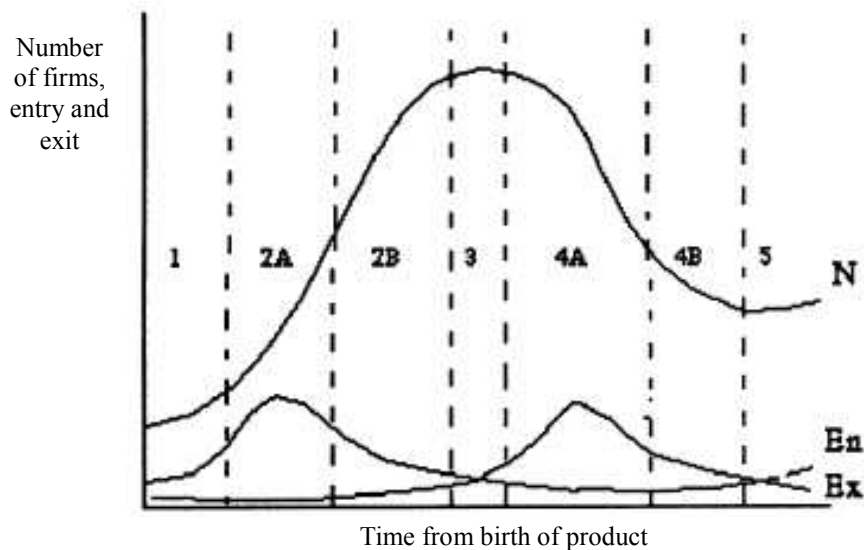
Besides, **theories of industry life cycle** link entry and exit with the stage of the industry life cycle of the product. Klepper and Graddy (1990) and Gort and Klepper (1982)²⁸ find that the type of firm that enters and exits out of an industry, is closely linked to the stage of the industry life cycle. Figure 2 shows the average pattern of gross entry, gross exit and number of firms in a market across the various stages²⁹.

The rise in number of firms in stage 2 is propelled by the high gross entry, which begins to decline at the end of stage 2A and reaches its trough in stage 4. Gross exit rises continuously until it reaches a peak in the middle of stage 4 and declines thereafter. The decline in number of firms in the market in stage 4 is, therefore, driven mainly by rising exit. Time series reveal, in general, a negative relationship between gross entry and exit except in stage 2A, where the positive association results mainly from the rising number of incumbent firms available for exit (Agarwal and Gort, 1996).

FIGURE 2: ENTRY, EXIT AND NUMBER OF FIRMS ACROSS STAGES

28 Agarwal and Gort (1996) and Klepper (1996) also deepen into the relationship between firm demography and the theories of industry life cycle.

29 Agarwal and Gort (1996) identify five phases based on gross entry: 1) initial low entry, 2) increasing entry, 3) decreasing though still generally high entry, 4) low entry, 5) erratic pattern.



Note: N = number of firms, En = gross entry, Ex = gross exit.
Source: Agarwal and Gort (1996)

Karlsson and Nyström (2003) examine the exit and entry of firms within this framework with special reference to innovation and knowledge-intensity. They analyze whether knowledge-intensity differs for Swedish manufacturing firms that exit and enter in different stages of the product life cycle. The empirical results show that entrants in the early stages of the product life cycle are more knowledge-intensive than incumbent firms. It is also found that firms exiting in early stages of the product life cycle are more knowledge-intensive than firms exiting in later stages. This is because early stages of the product life cycle imply a high degree of uncertainty and require a high level of knowledge-intensity. Since uncertainty decrease over the product life cycle, less knowledge is needed in production during later stages of the product life cycle.

In sum, the new variables considered by these models are: i) the technological regime, ii) firm size and age³⁰, iii) investment strategy, iv) industry life cycle, v) other individual variables, such as dummy variables for regional or international industries and foreign ownership, vi) regional or urban factors, which will be described in detail in Section 1.7.

Stylized facts

Geroski (1995) summarizes the empirical results about entry until that time and finds some stylized factors, which are updated by Bartelsman *et al.* (2004). We expose in this Section those ones referred to entry and exit, whereas Section 1.5 contains those ones related to survival.

- Entry is common. Large number of firms enter most markets in most years, but entry rates are far higher than market penetration rates. This difference arrives from the fact that entrants are much smaller than incumbents. In other words, small-scale entry is relatively easy, but large-

³⁰ Acs and Audretsch (1989a) find that small-firm entry varies considerably from the pattern of large-firm entry.

scale entry not.

- Although there is a very large cross-section variation in entry, differences in entry between industries do not persist for very long. In fact, most of the total variation in entry across industries and over time is “within” industry variation rather than “between” industry variation. Rather, entry seems to come in bursts that are not highly synchronized across industries. This observation is interesting because most other structural measures of industry competitiveness, which might be used instead of entry rates to describe the intensity of rivalry in markets, display very little “within” industry variation: the level of market concentration differs across industries but these differences are extremely persistent over time, and entry barriers are stable and structural features of particular industries which do not vary over time.
- Entry and exit rates are highly positively correlated, and net entry and penetration rates are modest fractions of gross entry and penetration rates. Entry and exit seem to be part of a process of change in which large numbers of new firms displace large numbers of older firms without changing the total number of firms in operation very much. This is difficult to reconcile with the traditional view that entry occurs when super-normal profits are positive and exit when they are negative. Audretsch (1995a) shows that entry and exit rates tend to be surprisingly high within a relatively short period of time. Agarwal and Gort (1996) observe that the positive entry/exit correlations make more sense in industries in steady state of maturity, while in early and late phases of a product’s life cycle these correlations indeed reverse to negative.
- *De novo* entry is more common but less successful than entry by diversification. Entry firms for diversifying firms creating new plants enter at a larger scale than the average incumbent, grow faster and are less likely to fail than *de novo* firms. However, there is some evidence to suggest that diversified firms may close particular plants more readily than specialized firms.
- Entry rates vary over time, coming in waves which often peak early in the life of many markets. Different waves tend to contain different types of entrants. Entry has a major effect on markets only at certain times in the product life cycle (Gort and Klepper, 1982). That is, entry rates tend to be higher for more recent industries but tend to decline as the industry matures (Klepper and Graddy, 1990; Klepper and Simons, 1993).
- There is a high pace of the reallocation of outputs and inputs across businesses that (i) is largely within narrowly defined sectors; (ii) differs substantially across sectors and firm characteristics (for example, much more churning amongst young and small businesses. (see Ahn, 2000 and Davis and Haltiwanger, 1999 for surveys of the literature).
- The pattern of reallocation that results from entries and exits is far from random. In developed market economies, the evidence is that the pattern of reallocation is productivity enhancing,

that is, outputs and inputs go from less productive to more productive businesses (Olley and Pakes, 1996; Griliches and Regev, 1995; Foster *et al.*, 2001, 2002).

Motives to start a firm

Shapiro (1983) distinguishes four main motives which can stimulate an individual to start a firm, from an entrepreneurial perspective: a) displacement factor, b) disposition to act, c) credibility, d) availability of resources. Except for the second one, more related to personal motivation, the three remaining ones may vary among regions and can explain regional differences in firm creation. The first one usually explains the exactly timing of the business formation and it may include negative factors -which are mainly push factors³¹: migration, unemployment, dissatisfaction with the present job, discrimination-, as well as pull factors -such as new market opportunities, completion of a study, etc.-. The second one refers to the appropriate personality to become an entrepreneur, and includes attributes such as need for achievement, locus of control, risk taking propensity, tolerance for ambiguity or family background. Credibility refers to the social position and esteem enjoyed by businessmen in a particular society and recognizes that in some “social climates” entrepreneurship flourishes more than in others. Political opinions and attitudes can also play a role. The last main motive can be regarded as the more material stimulus, which can help a potential new firm to start activities by reducing risks and costs either nationally or in particular regions. For example, special financial and tax incentives, management and marketing counseling or subsidized housing costs. From the policy perspective, this last motive is of particular interest because of the possibility of public intervention. However, Keeble and Wever (1986) argue that the credibility factor appears to have a much more significant influence in explaining regional variations in the number of new firms³².

From an industrial organization perspective, we may also distinguish between entry based on pull and push factors. The former include inadequate performance of incumbents, expected increasing in future entry barriers, business opportunities, possession of specific technologies and expected weak reaction by incumbents. The latter include inadequate performance in firm’s current markets and strategies, such as the need to protect the position of the company on narrowly linked markets.

1.4. Firm exit: literature review and empirical evidence

31 These factors are known as “push” since the individuals are being pushed out of their current employment. “Pull” entrepreneurs, on the other hand, are those who are lured by their new venture idea and its personal implications. They are being pulled out of their current position by the challenge and the potential rewards -monetary and others- related to a new successful venture (Amit and Muller, 1995).

32 Keeble and Wever (1986) suggest that in traditional new firm studies focused on the urban incubator hypothesis, too much attention has been paid to material and too little attention to social stimuli.

The exiting process and the reasons behind it shed considerable light on the process of firm selection, market evolution and adaptation of industry to change. Likewise, it generates significant social, territorial and personal costs. However, in spite of its relevance, there are relatively less studies referred to firm exit than firm entry. The greatest impediment to measuring the shares of exiting establishments is the lack of longitudinal data bases that identify the actual closure date of businesses. In addition, studies about firm exit may be less consistent, because of the time that passes by between the exit decision and the actual exit -because of the intention of recovering sunk costs-. To that effect, Caves and Porter (1976) suggest that exit is a less predictable phenomenon than entry.

Researchers have also explored details of exits, particularly in Europe and the United States. Harhoff *et al.* (1998) examine the probability of exit in German firms, distinguishing insolvency and voluntary liquidation. Taylor (1999) studies self-employment duration in the UK and distinguishes between involuntary and voluntary termination. Headd (2003) and Bates (2005) stress the existence of successful closures as well as unsuccessful closures. Honjo (1999b) studies survival of Japanese software firms and defines “failure” as exit by bankruptcy and “nonfailure” as other cases of exit.

The main determinants of exit mentioned in the literature are: i) level of profits, ii) industry growth, iii) age and size, iv) barriers to exit³³, v) technological regime, vi) stage of the industry life cycle -explained in Section 1.2-, vii) degree of industry concentration, viii) type of establishment already inhabiting the market, ix) gross entry, x) non-economic factors and xi) regional factors, which are explained in detail in Section 1.7.

In regard to the first variable, numerous investigations presume that each firm behaves with the objective of **profit** maximization, and exits from the market occur when the profit (or the ratio expected/realized profit) falls below some threshold (Jovanovic, 1982; Ghemawat and Nalebuff, 1985; Frank, 1988; Klepper, 1996; Das and Das, 1996). Although we cannot predict whether a particular loss firm will exit without knowledge of the specifics of its situation, we would expect differences in exit rates among large groups of firms to be related to their differences in the proportion of loss firms. In empirical studies, firm exits are supposed to be linked with economic variables represented by profit measures, such as the price-cost margin, or the rate of growth or contraction of the market³⁴ (Mansfield, 1962; Shapiro and Khemani, 1987; Austin and Rosenbaum, 1990). In particular, the higher **rate of industry growth**, the higher is demand relative to industry capacity and the lower will be the number of exits, since more firms are expected to cover their costs and realize profits. However, despite industry growth may depress the propensity to exit for business of all ages, new and smaller

33 Baldwin and Gorecki (1991) study both type of barriers in the Canadian manufacturing sector, Kleijwed and Lever (1996) and Dunne *et al.* (1998) analyze mobility barriers in German and American manufactures respectively and Doi (1999) determines the impact of exit barriers in Japan.

34 Although the negative relationship between profit and output seems clear, there is empirical evidence to the contrary and even no relationship between the two phenomena. This owes to the intention of recovering sunk costs (Ghemawat and Nalebuff, 1985; Siegfried and Evans, 1994; Cabral, 1995).

firms tend to be more adversely affected by low growth, because given their very low start up size, there is not a long way to go down. Symmetrically, smaller and younger firms are more positively affected by high growth³⁵ (Audretsch, 1995a). This author also finds an asymmetric effect: a higher rate of growth tends to shift the type of establishment exiting away from new entrants and towards incumbent businesses.

Most empirical studies include **size and age** as determinants of the exit process. Propensity to exit decreases both with age and size, since larger and older establishments have got more resources and ability of learning that enables them to stay in the market. Jovanovic's (1982) model of "passive learning" and Frank's (1988) model provide theoretical evidence about the relevance of size and age in the process of exit. Besides, both variables are highly correlated, so that new establishments tend to be substantially smaller than their mature counterparts. This generates disadvantages imposed by scale economies and higher costs. For example, Marcus (1967) points out that prices of some factors faced by small firms are higher; in particular, the cost of capital. Assuming that firms sell at the same price, this implies a lower profit rate and a higher probability of incurring losses given identical market risks.

Exits may also depend on the strength of **exit barriers**, which delay the exit from the market. The main exit barriers are scale economies and sunk costs, such as advertising, R+D investments or capital intensity. It is necessary to emphasize that barriers to entry may also constitute barriers to exit. Besides, since barriers to entry and exit vary considerably across industries, the process of firm selection is not constant across them. On the one hand, **scale economies** affect specially small and young firms. They are more vulnerable to the cost disadvantages imposed by high scale economies, and thus may be more likely to exit the market. Despite these firms are not deterred from entering industries with substantial scale economies, when they enter they must grow rapidly to become viable (Audretsch, 1995a). Besides, the negative consequences of small scale production in an industry with extensive scale economies are certainly greater than in an industry where only negligible economies of scale exist. Nonetheless, Audretsch (1995a) argues that suboptimal scale plants may compensate for their size disadvantage through a strategy of compensating factor differentials, for example, deviating from the manner in which productive factors are deployed and remunerated by their larger counterparts. On the other hand, despite economic theory predicts a firm will leave the industry if it is incurring losses -if it is earning less than their opportunity rate of return-, it does not mean that all loss firms exit, or that those which leave do so instantaneously. Marcus³⁶ (1967) shows that, if a firm decides to leave, the length of departure period is determined by the **ratio of variable to sunk costs**.

35 This is consistent with the findings of Mills and Schumann (1985) that small firms account for greater share of economic activity during economic expansions and a reduced share during contractions (In: Audretsch, 1995a).

36 The full model is: $Ex_{it} = \alpha_0 + \alpha_1 PLF_{it} + \alpha_2 K/O_{it} + \alpha_3 r_{it+1} + u$ where Ex_{it} , PLF_{it} and K/O_{it} refer, respectively, to the i industry exit rate, proportion of loss firms, the capital-output ratio all in period t , and where r_{it+1} is the realized rate of return in the $t + 1$ period.

Sunk costs may be quite small, such as licensing and incorporation fees, or very large such as capital assets, advertising or research costs. The lower the ratio of variable to sunk costs, the greater, *ceteris paribus*, is the likelihood that part of sunk costs is being recovered and the less likely is the firm to shut down immediately. Therefore, for a given proportion of loss firms, exit rates are negatively related to the ratio of sunk to variable costs. These results are consistent with Caves and Porter (1976), Mac Donald's (1986) and Frank (1988), whose model predict that the larger the sunk costs, the longer a series of bad results that will be required to induce exit.

As new firm survival varies considerably across industries and it is strongly influenced by the technological conditions (Audretsch, 1995a), the propensity for new entrants to exit was found to depend on a number of industry-specific characteristics, most notably the technological regime. In regard to the **technological regime**, Audretsch (1995a) suggests that chances of a new firm to exit are higher in industries characterized by the entrepreneurial regime.

Harrigan (1980) models the process of exit as an strategic game between competitors, and finds that the incentive to encourage incumbent rivals to exit rises along with **industry concentration**. In this regard, Audretsch (1995a) finds that incumbents account for a greater share of exiting establishments in highly concentrated markets, consistently also with Cosutta and Grillo (1986) and Baden-Fuller (1989).

The **type of establishment** already inhabiting the market and the **gross entry rate** are also important. Audretsch (1995a) includes small firm share to account for the first effect and to control for the existing establishment size distribution. The extent to which exiting establishments are accounted for by new entrants may be influenced by the degree to which new businesses are entering the industry. However, Audretsch (1995a) finds a negative effect in both cases. Love (1996a), on the other hand, notices that entry is the dominant determinant of exit.

There are **other factors**, such as the natural abilities of the owner, that are also important in explaining the probability of exit. However, these variables can be regarded as randomly distributed among different industries, specially in a conditional analysis. So, the estimators remain unbiased.

Finally, Harada (2007) shows that small firm exits occur not just because of economic difficulties in their business but also for **non-economic reasons**, which account for more than 60% of the exits studied in Japan. These reasons include aging, illness or injury of the manager or relatives and diminished motivation for the business. Likewise, the probability of non-economic-forced exit is significantly higher if the manager is relatively old and/or female, the firm has not loans from a financial institution or if its sales are not decreasing.

1.5. The relationship between entry and exit: Independence, symmetry or simultaneity?

Despite firm entry and exit result from decisions taken by different units and depend on

different factors, they are not isolated phenomena. In fact, the correlation between the regional rates of entry and exit is usually strong (Keeble and Walker, 1994; Reynolds *et al.*, 1994), specially within manufacturing sectors (Dunne and Roberts, 1991). These facts suggest that the entries and exits of the markets are not independent processes but somehow interrelated.

First, studies which focus on one side of market implicitly assume that the **independence hypothesis** holds, that is, that there is no link between entry and exit. They have either analyzed the factors determining the entry of new firms (Orr, 1974; Geroski, 1991a; Baldwin, 1995) or the exit of incumbents (Marcus, 1967; Mata and Audretsch, 1995; Doi, 1999). As it is previously exposed, entry and exit are function of, respectively, barriers to entry and exit. Besides, international empirical evidence suggests that there are (dis)economies at the regional level that directly affect the decisions to enter and exit. Keeble and Walker (1994) and Reynolds *et al.*, (1994) show that, even after controlling for differences in the industrial mix, there are substantial differences in the regional rates of entry and exit. Thus, the specification of the typical reduced-form model is given by the following expressions, which should be estimated separately:

$$\text{LNGRE} = f(\text{BARENT}, \text{REGIO}, \text{CYCLE}) \quad [3]$$

$$\text{LNGRX} = f(\text{BAREXI}, \text{REGIO}, \text{CYCLE}) \quad [4]$$

where f is a mathematical function that links entry and exit to their determinants; LNGRE and LNGRX are, respectively, the natural logarithms of the gross rate of entry and exit; BARENT and BAREXI are vectors of variables that take into account the presence of, respectively, barriers to entry and barriers to exit³⁷, REGIO is a vector of variables made up of regional characteristics relevant to the decisions to enter or exit and CYCLE is a vector of control variables to allow for the effects of the business cycle (Arauzo *et al.*, 2007). Nevertheless, this hypothesis is very restrictive and may be affected by several specification errors (Manjón, 2002).

Second, the **symmetry hypothesis** states that barriers to entry are also barriers to exit, that is, the determinants of the rate of entry and the rate of exit are identical, or are highly correlated. For example, the specific investments that act as entry barriers may become exit barriers, once the new company has entered the market and the investment becomes a disincentive to leave it. Shapiro and Khemani (1987) firstly empirically examine this hypothesis, in which specification equations for entry and exit should be the same:

37 Arauzo *et al.* (2007) consider for BARENT the technological intensity; product differentiation; capital requirements; market power of the incumbents; profit margins; benefits ex-post and a proxy for market turbulence. Among the barriers to exit, they include: benefits ex-ante and several variables that may indicate the magnitude of the sunk costs: technological intensity, product differentiation, initial investment and size of the concerns. This is indeed what is mostly found in the literature (Siegfried and Evans, 1994; Carree and Thurik, 1996).

$$\text{LNGRE} = f(\text{BARENT}, \text{BAREXI}, \text{REGIO}, \text{CYCLE}) \quad [5]$$

$$\text{LNGRX} = f(\text{BAREXI}, \text{BARENT}, \text{REGIO}, \text{CYCLE}) \quad [6]$$

Third, the **simultaneity hypothesis** states that the entry of new companies encourages the closure of active companies, and viceversa, that is, that rates of entry and exit in a given sector or region can be considered to be simultaneously determined³⁸. Thus, entrances influence exits because they increase the pressure of competition in the market and displace the least efficient companies. This is the displacement effect. On the other hand, the companies that decide to abandon the market leave behind niches of unsatisfied consumers that encourage new companies to enter. This is the replacement effect. In the general formulation, the endogenous variables appear as covariates:

$$\text{LNGRE} = f(\text{BARENT}, \text{BAREXI}, \text{REGIO}, \text{CYCLE}, \text{LNGRX}) \quad [7]$$

$$\text{LNGRX} = f(\text{BAREXI}, \text{BARENT}, \text{REGIO}, \text{CYCLE}, \text{LNGRE}) \quad [8]$$

Within the simultaneity hypothesis, Audretsch (1995a) argues that the evolutionary process of entry and exit may be characterized by three alternative metaphors. The relevant question is not which one is correct but under which circumstances is each metaphor more applicable:

1. The forest metaphor, that is, the displacement of incumbent enterprises by new firms. It dates back at least to Marshall (1920). He describes that, in the evolutionary market process, one can observe "...the young trees of the forest as the struggle upwards through the benumbing shade of the older rivals". Schumpeter (1911) describes a process of creative destruction, where new firms with entrepreneurial spirit displace the tired old incumbents, leading to higher economic growth. One may wonder why would established incumbents be unable to fend off new entrants, given their inherent advantage both in available resources and leverage. Audretsch (1995a) answers that it is because of information asymmetries, principal-agent problems and the difficulties involved in monitoring.
2. The metaphor of the revolving door: the bulk of exiting firms is accounted for by new entrants. That is, the majority of new entrants will not survive past the very short run, so that there is considerable exit and very little permanent penetration.
3. The metaphor of the conical revolving door, where the top part -representing the largest enterprises in the industry- revolves much more slowly than the lower part -representing the small firms in the industry-. This view is consistent with the findings that the likelihood of

³⁸ We must therefore ask whether a displacement-replacement effect is actually involved or whether it is simply a continuous process of trial and error.

survival is positively related to firm size and age and that firm growth tends to be negatively related to firm size³⁹. The barriers to survival determine the speed of the door. And the greater the degree of technological change and the extent of scale economies in the industry, the faster this conical door will revolve.

The evidence about which hypothesis is correct is not conclusive. The initial studies aim to reject the independence hypothesis. With regard to this, Shapiro and Khemani (1987), using Canadian cross-section data, conclude that symmetry exists, since barriers to exit are barriers to entry as well. They even find some evidence of displacement. Caves and Porter (1976), Eaton and Lipsey (1980 and 1981) and Evans and Siegfried (1992) for the United States also find evidence that supports symmetry hypothesis.

More recent studies test symmetry hypothesis versus simultaneity hypothesis. This is relevant because omission of simultaneity, if it exists, may lead to several specification errors. On the one hand, Austin and Rosebaum (1990) and Rosebaum and Lamort (1992) for the U.S. and Fotopoulos and Spence (1998) for Greece, reject simultaneity. On the other hand, Segarra *et al.* (2002), Sleuwaegen and Dehandschutter (1991), Evans and Siegfried (1992) and Kleijweg and Lever (1996) for Spain, Belgium, U.S. and Netherlands respectively, support the existence of a displacement effect.

In regard to the three metaphors, a study of the British manufacturing industry made by Love (1996b) concludes that the interaction between entry and exit is mainly a product of a revolving door effect. Likewise, Manjón (2004) finds evidence of the existence of a conical revolving door phenomenon. Audretsch (1995a) finds that the type of establishment exiting depends considerably on the technological and demand characteristics of the industry. The revolving door metaphor seems more appropriate in markets where scale economies play an important role and where innovative activity is dominated by larger enterprises. By contrast, the forest metaphor may be more applicable in industries where the underlying conditions closely conform to the entrepreneurial regime.

Finally, Arauzo *et al.* (2007) demonstrate that sectoral, regional and business cycle variables are important for analyzing industrial rotation and confirm the simultaneity hypothesis for Spanish manufacturing firms during the 1980s and early 1990s⁴⁰.

1.6. Survival: literature review and empirical evidence

In industrial economics, firm survival has been analyzed, at first, within the framework of firm

39 Audretsch (1995a) mentions studies by Mansfield (1962), Dunne, Roberts and Samuelson (1988 and 1989), Evans (1987a and 1987b), Phillips and Kirchhoff (1989), Audretsch (1991 and 1994), Audretsch and Mahmood (1993, 1994 and 1995), Mahmood (1992), Hall (1987), Mata (1993) and Wagner (1992 and 1994).

40 Nevertheless, estimates from the symmetry and simultaneity hypotheses tend to agree, are relatively stable and jointly statistically significant.

growth, since only survivors are able to grow. Then, it is treated as a particular point within the literature on entry and exit to become, in the nineties, in an independent field of research (Fotopoulos and Louri, 2000a). Once again, the main obstacle is the lack of panel data that follow the evolution of firms since its birth (Audretsch, 1991).

The initial empirical studies explain firm survival according to a set of **variables defined at the industry level**. In this sense, Audretsch (1991) finds that industry concentration, capital intensity and economies of scale affect adversely the survival of new firms, thus supporting the idea that entry barriers are more effective as barriers to survival. Moreover, industry growth reduces costs disadvantages, enhancing survival prospects of firms that enter with a sub-optimal size. Entry barriers -that affect industry contestability- and technology conditions are also found to play a significant role in determining hazard (Fotopoulos and Louri, 2000a).

As concentrating the analysis entirely at the industry level is recognized as a limitation, **firm-specific variables** are subsequently introduced: start-up size, age, firm growth, stage of industry life-cycle, capital intensity, technology employed, industry's innovation rate, financial structure and ownership status. As for the first variable, the larger the start-up size, the less is the distance to be covered by newcomers in approaching an industry's minimum efficient size and hence the more competitiveness and the more chances to survival. A positive influence of start-up size on survival of new firms was empirically established in various developed countries (U.S., Canada, Portugal, Greece)⁴¹. As for the age, empirical studies show that new firms usually have a relatively high risk of failure during the first years of their existence. The main reasons for such a *liability of newness* are the problems of setting up an organizational structure, attaining its first profits and getting the new unit to work efficiently enough to compete. Some authors assume that older firms also face a relatively high likelihood of closing down, which is called the *liability of aging*. The main reason could be the inflexibility of established organizations (*liability of senescence*); an erosion of technology, products, business concepts, and management strategies over time (*liability of obsolescence*); or, particularly in the case of owner-managed firms, problems in finding a successor (Fritsch *et al.*, 2006).

Besides, Agarwal and Audretsch (1999) suggest that the size-survival relationship is shaped by the stage of industry life-cycle and the potential for smaller firms to occupy market niches in their effort to overcome size related disadvantages. Doms *et al.* (1995) demonstrate that capital intensive plants and plants employing advanced technology are less likely to fail. Besides, an industry's overall innovation rate affects negatively firm survival but not in industries where small firms have innovative advantage (Audretsch, 1991; Audretsch and Mahmood, 1995). Agarwal (1996; 1998) shows that new and small firms enjoy a higher probability of survival in more technical-product industries and in

41 Fotopoulos and Louri (2000a) mention that Audretsch and Mahmood (1993; 1994), Dunne and Hughes (1994), Baldwin and Rafiquzzaman (1995), Mata *et al.* (1995) and Fotopoulos and Louri (2000b) provide strong favourable evidence, while Wagner (1994) presents ambiguous results.

phases of higher technological activity in an industry's life cycle. In regard to financial variables, Fotopoulos and Louri (2000b) find that a conservative borrowing, larger initial financial size, heavier fixed asset commitment, higher profitability and lower diversification reduce the probability of exit. Evidence on ownership status shows that the hazard confronting branches of multi-plant firms and subsidiary firms is higher than that of single-plant entrants (Audretsch and Mahmood, 1995) suggesting that exit may be a strategic decision, taken more easily by diversifying firms.

Macro-economic conditions may also facilitate or obstruct survival. In this sense, Audretsch and Mahmood (1995) show that the hazard rate for new firms is higher during downturns. They also observe a negative relationship between interest rate and the hazard confronted by U.S. companies. The explanation offered is that new firms in that country are not dependent on external capital. On the other hand, Boeri and Bellman (1995), suggest that exit in German manufacturing does not depend on the economic cycle. In Greece, Fotopoulos and Louri (2000b) find that firms established closer to economic downturns are more likely to fail, probably because they face adverse market conditions with little experience. Finally, just a few studies include **individual characteristics of the entrepreneurs** (van Praag, 2003) or **firm strategies** (Littunen, 2000).

Geroski (1995) mentions some stylized facts related to survival, which are updated, among others, by Bartelsman *et al.* (2004):

- The survival rate of most entrants is low, and even successful entrants may take more than a decade to achieve a size comparable to the average incumbent. That is, the likelihood of a firm exiting apparently declines with both age and size (Audretsch, 1995a), since experience may be crucial determinant of survival rates. Further, the process of firm selection does not seem to be constant across industries. There is evidence to suggest that survival rates vary more across industries than entry rates (Audretsch, 1991; Mata and Portugal, 1994; Wagner, 1994).
- Costs of adjustment penalize large-scale initial entry and very rapid post-entry penetration rates. In other words, despite the probability of survival tends to increase with firm -or plant-size; conditional on survival, the proportional rate of growth of a firm is decreasing in size (Evans 1987a, 1987b; Dunne *et al.*, 1988, 1989).
- Klepper and Graddy (1990) and Gort and Klepper (1982) also find that the type of firm that exits out of an industry is closely linked to the stage of the industry life cycle.

As for the methodology, the initial econometric method for analyzing the lifetimes of firms has been the econometric model proposed by Cox (1972; 1975). It allows the analysis of the duration of a sample of firms that belong to different cohorts or time origins. The aim is to explain the probability that a firm exits in t , conditional on that it has survived up to the time just before t . It can also be extended to include time-varying covariates along with time-invariant ones (Lancaster, 1990), which

allows to explain the probability of exit at t for firms that had not exited earlier and whose covariates had followed a certain path. Nowadays, there are several econometric specifications to account for survival, and the subject have progressively become more sophisticated, addressing issues such as discrete time, unobserved heterogeneity and competing risks (see Manjón and Arauzo, 2008, for a survey).

1.7. Spatial issues on firm dynamics

Spatial factors have been more recently included as determinants of firm demography. They have been taken into account mainly in two ways: on the one hand, their influence in the entry of firms -industrial location- and, on the other hand, their impact on firm survival -which implies analyzing exit of firms as well-. The first group of contributions dates back to the ends of 19th century (Marshall, 1890) and its relevance has been recently increased, due to the same reasons that lay behind the interest on firm demography. Nowadays, firm location is a subject of great interest. Businessmen want to know where to locate their plants, as well as state planners want to know the best way to attract new employment to their state. Besides, regional economists use business location to get an advance reading on the health of an economy: locational choices are a better barometer of a region's future than employment at existing plants, since newly locating plants respond to current incentives instead of prior locational decisions (Carlton, 1983).

However, despite urban and regional economies have been often employed to explain regional patterns of entry and exit, they have hardly been used to explain post entry performance. So, research about the effect of spatial factors on firm survival dates back just to the beginning of this century. The first academic studies to assess for the impact of location and agglomeration economies on firm survival are Fotopoulos and Louri (2000a), Baldwin *et al.* (2000) and Honjo (2000a and 2000b).

This section is organized in three subsections: the first one is devoted to the initial contributions that explain why new industries emerge in particular places. We describe the seminal works that analyze agglomeration economies and diseconomies, localization and urbanization economies, as well as internal and external economies of scale. In the next subsection we discuss recent research about industry location. As it has been explained through three theoretical perspectives, we describe three groups of determinants: neoclassical, institutional and behavioural. At last, in the third subsection, we expose the recent literature about the influence of spatial factors on firm survival. It is interesting to note that industrial location and post entry performance are closely related phenomena, since a firm will choose to locate in the region or the city that provides it higher profits. Thus, location may also be seen as an indirect approach to the relationship between agglomeration economies and efficiency.

1.7.1. Initial Contributions (1826-1970)

The analysis of the influence of spatial factors and the characteristics of the territories in location of economic activity begins in the 19th century. Von Thünen (1826) designs a model that explains the location of crops in a homogeneous space around a market, which is represented by the city. He supposes different yields per hectare and transport costs. He concludes that, if farmers and landowners were allowed to compete among them for the use of the land, a gradient of leases would be established, and it would decline as it moves away from the areas near to the population. Every farmer chooses between paying more for the land or in terms of transport costs. The result corresponds to a model of concentric rings of production.

Weber (1909) adapts Von Thünen's analysis to study the determinant factors of the ideal location of an industry during times of development and growth. At first, he argues that the optimal location is given by the place in which the costs of transport are minimized, either to the market or to sources of raw materials. Only located production factors affect location decision and this may coincide with the location of raw materials, with the market or be any intermediate point. Secondly, Weber also believes that the optimal location decision may be taken according to the proximity to labor market, instead of minimizing only the transport costs, provided that the additional transport costs are offset by the savings due to the concentration of labor. Finally, he introduces for the first time the concept of **agglomeration economies** as a factor that compensates for higher costs of transport and that justifies the establishment of a firm near others belonging to the same industry.

Marshall (1890) is the first author to distinguish between **economies of scale internal and external** to the firm. The former consist of a decrease on the average cost of the firm as it increases its output, while the latter occur when the average cost is reduced by an increase in the volume of industry production, keeping constant that of each individual firm. External economies are classified into three categories: those that come from a specialized labor market, those resulting from the availability of suppliers and those related to the ease of transmission of information among agents located in the same geographic area. He also raises the concept of **industrial district** as a model of organization of production for some sectors in certain areas.

In addition, Hoover (1936 and 1937) classifies external economies into two types: **localization economies** and urbanization economies. The former are internal to the industrial sector to which the company belongs and occur when a firm obtains profits from locating close to other firms in the same industrial activity. Spatial concentration of a sector generates specialized production factors -which are shared by different companies-, the development of a suppliers' market of raw materials and intermediate inputs -that implies both reduced transport costs and efficiency and scale gains- and a

better organization of the labor market. On the other hand, **urbanization economies** are not related to a particular sector and, therefore, they are appropriable for all firms that share the same location, regardless of the industrial sector. They are defined as the concentration of economic activity and resources that benefit all firms located in the same area as they can operate more efficiently. These economies include, for example, the existence of commercial and financial services, the nearby presence of specialized suppliers of inputs and services, the access to public services, to infrastructure and to transport services, the existence of a business climate and a creative atmosphere, and the flows of ideas (knowledge spillovers) that allow the technological or organizational advances move more easily from one firm to another. To that effect, Jacobs (1969) supposes that the city is the environment in which knowledge transfer is more viable. Thus, she argues that the main factor that favors this transfer is the diversity of productive sectors. Therefore, empirical studies relate the presence of economies of urbanization to the dimension of the urban agglomerations, measured usually in terms of the quantity of population, the number of people employed or the total companies in each area (Viladecans, 2004; Viladecans and Jofre, 2006).

Symmetrically, Townroe (1969) introduces the notion of **urbanization diseconomies**, which explain why economic activity is not concentrated in a single geographical point. When an area overcomes the efficient dimension, problems associated with excessive concentration arise, such as congestion, higher prices of some inputs, social problems or pollution, and may limit the advantages of agglomeration.

Thus, there is a trade-off between agglomeration economies and agglomeration diseconomies, since the former generate benefits for the agents located in a certain region and provoke the attraction of more agents (**centripetal forces**), whereas the latter have an opposite effect and generate costs associated with the proximity, which restrict the location of new firms and even lead to the expulsion of the existing ones (**centrifugal forces**).

The benefit of agglomeration economies is not neutral to the age of the firm. Thus, the **incubator hypothesis** states that new businesses are located in the central areas of large cities, where they can enjoy the environment they need in the initial stages of the life and, later, they move towards peripheral locations. Vernon and Hoover (1959) intensify the advantages that big cities offer to birth of firms as well as their survival in the first years of life.

Similarly, external economies are more important the smaller the size of the firm. This is because small firms generally have limited resources, and this leads them to depend more on the facilities offered by the environment in which they are located. This dependence decreases with increasing firm size and its ability to provide for themselves services not provided by the environment. The localization patterns are neither uniform across sectors, as firms from different sectors also have different needs. Finally, benefits from agglomeration economies may depend on the level of

technological maturity of each sector. This is related to the theory of industry life cycle, since the needs of business environment depend on the stage of industry life cycle of the product. However, models and empirical studies that link agglomeration economies to stage of industry life cycle and firm location, are very recent (Duranton and Puga, 2001) and are explained in the next subsection.

1.7.2. Recent Contributions on Industrial Location

Despite the location of production units has been a major topic since 19th century, since nineties there has been a boost in the number of empirical studies investigating the driving forces behind location decisions. The increasing number of public programs aiming to attract and promote the creation of new businesses, the advances in analytical foundations and econometric modeling, as well as a wider access to suitable data sets, are some of the reasons that explain the growing interest in the determinants of industrial location (McFadden, 2001; McCann and Sheppard, 2003; Guimarães *et al.*, 2004).

There are basically two ways to explain which factors affect entry decision into an specific location: i) from the viewpoint of the agent that makes the choice or, alternatively, ii) from the viewpoint of the chosen territory. In the former case, factors related to the agent taking the decision - size, sector, etc.- and those related to the set of alternatives -population, infrastructures, etc.- are considered and the unit of analysis is the establishment. In the latter, the unit of analysis is geographical -municipality, city, province, region, etc.- and the main objective is to analyze which characteristics of a territory affect the average number of new concerns that are created therein (Arauzo *et al.*, 2010). There are also two alternative geographical units considered: the regional and the urban ones. The former refers to broader areas like provinces or regions where there are multiple relationships among firms, public institutions and individuals, while the later refers to smaller units (usually cities) where density of economic activity is considerably higher.

Arauzo *et al.* (2010) survey recent empirical literature about industrial location and find that the basic analytical framework has remained unaltered since the early contributions of the 1980's, while, in contrast, there have advances in the quality of the data and in the econometric modeling⁴². Thus, most recent contributions to this literature consist of new evidence on certain determinants - taxes, wages, agglomeration economies, etc.- or new empirical and econometric approaches, often using new data sets, for example, data for smaller geographical areas, with longitudinal structure, etc. As a result, these investigations differ substantially in terms of econometric specifications, the definition of covariates and sampling characteristics -data sources, statistical units, institutional

42 Nowadays, Discrete Choice Models (Conditional Logit, Multinomial Logit and Nested Logit) and Count Data Models are the basic econometric tools used in empirical studies on industrial location.

settings, etc.- and these differences makes it hard to determine why some results vary across studies.

The theoretical perspectives used to explain entry decisions of new firms can be grouped into three main categories: neoclassical, institutional and behavioural (Hayter, 1997), although there are factors that might be attributed to different theories. Neoclassical theories consider that rational and perfectly informed agents choose the optimal locations on the grounds of profit-maximizing or cost-minimizing strategies. Thus, **neoclassical determinants** are profit- or cost-driving factors such as agglomeration economies, transport infrastructures, stage of industry life cycle of the product and human capital. As for the **institutional theories**, they extend the neoclassical framework by considering that agents decide locations given a network of economic relations -with clients, suppliers, competitors, unions, public administrations, etc.- that also affect profit and cost functions. Accordingly, institutional factors somehow measure how these relationships affect location decisions. They include, for example, actions taken by public administrations, in particular, taxes, environmental regulations and incentive programs for new business. Lastly, **behavioural theories** emphasize the role of individual preferences. Thus, while neoclassical and institutional theories stand on factors that are “external” to the firm, behavioural factors have an “internal” (size, age, etc.) and “entrepreneurial” (previous experience, residence, etc.) nature.

Neoclassical determinants

Recent research related to **agglomeration economies** include i) a dynamic or historical dimension of the economies of localization and urbanization, ii) the relationship with the theory of industry life cycle of the product and iii) the scope of the economies. In regard to the former, some studies consider that the history of a geographic area -proxied by the concentration of historical industrial sector or the size of an industry in the past- is relevant to explain the productivity or the current location of the production units. Thus, **dynamic externalities** deal with the role of prior information accumulations in the local area on current productivity and hence employment. Such accumulations are fostered by a history of interactions and cultivated long-term relationships, which lead to a buildup of knowledge -“local trade secrets”-, available to firms just in a local area.

Thus, Glaeser *et al.* (1992) adapt the concepts of urbanization and localization economies to a dynamic context, and distinguish three types of dynamic externalities: MAR, Porter and Jacobs. MAR external economies come from the contributions of Marshall (1890), Arrow (1962) and Romer⁴³ (1986) and derive from a buildup of knowledge associated with ongoing communications among local firms in the same industry. Therefore, the savings would be equivalent to localization economies in a

43 The literature on endogenous growth models argues that dynamics information externalities are the driving force for technological innovation and hence economic growth (Romer, 1986).

dynamic context. Similarly, Porter (1990) economies consider that the accumulation of knowledge among companies specialized in the same activity and concentrated geographically stimulate the economic growth. However, unlike the previous approach, Porter believes that perfect competition is the market structure in which this transfer is more successful. At last, Jacob economies owe to the studies of this authoress based on the assumption that the city is the way in which knowledge transfer is more viable. They state that a buildup of knowledge or ideas associated with historical diversity favors this transfer. Thus, they are the dynamic equivalent of the urbanization economies.

Henderson *et al.* (1995) follow this typology, but they do not take into account Porter externalities. They observe that the influence of MAR and Jacobs externalities depends on the level of technological maturity of each sector. Thus, for mature capital goods industries, they find evidence of MAR externalities, but none of Jacobs externalities. That is, employment growth in traditional manufacturing industries is higher in cities with high past employment concentrations in the own industry. On the other hand, for new high-tech industries, they observe evidence of Jacobs as well as MAR externalities, even though the former seem to be more important. That is, high-tech firms are more likely to take root in cities with a history of industrial diversity. They conclude that Jacobs externalities are important for a city's ability to initially attract new industries, but for retaining these industries prior concentration of the own predecessor industry is what matters.

These findings are consistent with the **theory of product cycles**: new industries prosper in large, diverse metropolitan areas, with innovative environments plenty of qualified human capital. However, with maturity, production decentralizes to smaller, more specialized cities with lower costs. This happens because different costs of production -capital, R+D, management, unskilled labor, etc.- have different relative importance depending on the phase of the product life cycle. This means that the needs of business environment depend on the stage of industry life cycle of the product. Duranton and Puga (2001) build a dynamic general-equilibrium model and derive conditions under which diversified and specialized cities coexist. They find that new products are developed in diversified cities, trying processes borrowed from different activities. Once firms find their ideal process, they switch to mass production and relocate to specialized cities where production costs are lower. These authors find evidence of this pattern for France.

In particular, high-tech firms are more likely to be found around populated areas. Bade and Nerlinger (2000) find that German start-ups in technology intensive industries prefer to be located in large agglomerations. This also seems to be the case for small and medium size biotech firms and large R+D labs in France (Autant-Bernard, 2006; Autant-Bernard *et al.*, 2006). Arauzo and Viladecans (2009) also show that Spanish manufacturing establishments in high-tech industries prefer to be located as close as possible to the centre of the metropolitan area.

Besides, Rosenthal and Strange (2004) analyze the **scope of the economies of agglomeration**.

They mention three types of scope of urban increasing returns -sectorial, territorial and temporal- and note that agglomeration economies weaken with the distance in all cases. Sectorial scope concerns the degree to which economies of agglomeration are spread to all industries or whether they are specific to a particular activity. Thus, it may be relevant to analyze the scope that increasing returns have inside a value chain, which includes shared suppliers or customers, that belong to different traditional industrial classifications. Territorial scope refers to the impact that the economic activity of an area has on the economic activity of a neighboring area, that is, to spatial autocorrelation. Ciccone and Hall (1996) give a first step to consider the geographical environment as a determinant of agglomeration economies, by taking into account the economic density of the neighboring states as a determinant of differentials in productivity. Moreover, Rosenthal and Strange (2003), have identified the precise geographical scope, which varies depending on the productive sector and the type of economies of agglomeration. In regard to temporal scope, Glaeser *et al.* (1992) and Henderson *et al.* (1995) show that previous agglomeration economies may have impact on current productivity and employment.

Another cost-driving neoclassical factor is **transport infrastructures**. Since a substantial part of business activities involves moving inputs and outputs, better accessibility to transport infrastructures has been hypothesized to have a positive impact on the location decisions of firms. This has been supported by a number of empirical studies in Belgium (Baudewyns *et al.*, 2000), Spain (Holl, 2004b; Arauzo, 2005; Alañón *et al.* 2007), Poland (Cieřlik, 2005), Portugal (Holl, 2004a) and the U.S. (Coughlin *et al.*, 1991; Friedman *et al.*, 1992; Smith and Florida, 1994; Luker, 1998; Coughlin and Segev, 2000; List, 2001). However, the importance of this effect differs across manufacturing sectors, which indicates that accessibility requirements may vary with technology and/or demand.

Among the **human capital characteristics**, wages and education have been the most actively explored. First, it has been largely demonstrated that firms tend to avoid areas with higher wages⁴⁴. Second, most studies tend to conclude that geographical areas that have a higher mean level of education in the working population are more attractive (Coughlin *et al.*, 1991; Woodward, 1992; Smith and Florida, 1994; Coughlin and Segev, 2000; see, in contrast, Bartik 1985 and Arauzo 2005). Universities may also play an important role, since knowledge-based start-ups may cluster around them, influenced by the knowledge output as well as the innovative capacity of the region (Audretsch and Lehmann, 2005). The impact of unemployment on location may not be *a priori* determined. On the one hand, it may stimulate individuals to start a firm and may imply a lower cost of labor, but, on the other hand, it may reflect a weaker demand and, hence, lower expected benefits -see, for example, Coughlin *et al.* (1991) and Cieřlik (2005b) for evidence of positive effects of unemployment on

44 Arauzo *et al.* (2010) mention Luger and Shetty (1985); Coughlin *et al.* (1991); Papke (1991); Friedman *et al.* (1992); Henderson and Kuncoro (1996); Luker (1998); List (2001); Barbosa *et al.* (2004) and Basile (2004). Evidence on the contrary may be found in Smith and Florida (1994).

location and Woodward (1992), Storey (1991) and Reynolds *et al.* (1994) for negative effects-. Other factors related to human capital characteristics analyzed by the literature include: level of unionism (Coughlin *et al.*, 1991; Friedman *et al.*, 1992; Head *et al.*, 1995), labour productivity (Schmenner *et al.*, 1987; Friedman *et al.*, 1992; Barbosa *et al.*, 2004), poverty (Woodward, 1992), number of scientific publications and academic research (Autant-Bernard *et al.*, 2006) and relevant managerial skills (Love, 1996).

Finally, **other neoclassical determinants** used to explain industrial location are: energy price (Carlton, 1979 and 1983; Schmenner *et al.*, 1987), land costs (Hansen, 1987; Papke, 1991; Cheng and Stough, 2006), foreign trade zones (Head *et al.*, 1999), local demand (Henderson and Kuncoro, 1996), local income (Love, 1996) and agglomeration of foreign firms (Basile *et al.*, 2003). In their survey, Arauzo *et al.* (2010) provide details about spatial unity, period, industry level, main determinants and econometric specification for each study.

Institutional factors

Institutional factors include the actions taken by public administrations, in particular: i) taxes, ii) environmental regulations and iii) incentive programs. The effects of **tax incentives**⁴⁵ is ambiguous and findings “are so disparate that they offer little guidance to policy makers” Buss (2001) -see this author for an overview-. In the 1980s, studies about firm location decisions tend to support earlier tax literature, finding little or no impact of taxes on location. Over time, studies show that taxes seem to matter once firms have made decisions on labor, transportation, raw materials and capital costs. Some research in the nineties departs from the representative firm approach (Fisher and Peters, 1997) and allows for the possibility that some taxes impact relatively more on particular businesses, for example, taxes on machinery on capital-intensive industries. Besides, manufacturing location decisions seem more sensitive to taxes than nonmanufacturing location decisions (Fisher, 1997). As for FDI, several studies -Coughlin *et al.*, 1991; Friedman *et al.*, 1992; Woodward, 1992; Devereux and Griffith, 1998 and Coughlin and Segev, 2000- report a negative effect of taxes on the location of foreign firms. More recently, Gabe and Bell (2004) argue that there is a trade-off between taxes and the provision of public goods and services. They show that high-tax locations are on average more attractive than low-tax locations with a poor provision of public goods and services.

The evidence is neither conclusive with regard to **environmental regulations** -see Jeppesen *et al.* (2002) for an overview-. On the one hand, initial studies (Bartik, 1988; Mc Connell and Schwab, 1990, Levinson, 1996) conclude that the effects of environmental regulations on firm location are

45 Tax incentives usually refer to direct and indirect government subsidies to business that are not inherently part of a generally accepted tax structure, including but not limited to property tax abatements, tax exemptions, low interest loans, firm-specific infrastructure, and firm-specific job training (Coenen and Hellerstein, 1996, p. 793).

minimal or non-existent. Particularly, List (2001) reports similar results for the FDI in California. On the other hand, Becker and Henderson (2000) conclude that manufacturing plants have moved from areas where the air-quality standards have not been attained to areas where they have. Similarly, List and McHone (2000) find that manufacturers in pollution intensive sectors in the U.S. are deterred severely by more stringent county-level environmental regulations. Thus, these regulations generate the diversion of new pollution intensive plants to counties with less stringent regulations, which are also counties historically free of pollution. They recognize that more research needs to be done in order to evaluate the efficacy of those environmental policies.

Finally, there is no conclusive evidence about the effectiveness of **public incentive programs** to attract new firms. Lee (2004) shows that these programs have had little effect on relocation decisions in the U.S., even though firms located in states that implement these programs seem to have been benefited in terms of growing employment, capital and output. Guimarães *et al.* (1998) reach similar conclusions with respect to the regional incentive policies of Puerto Rico in the early eighties. In contrast, FDI seems to be more sensitive to this kind of incentives, as it is to tax reduction, since support of public administration has been found to be a critical determinant (Friedman *et al.*, 1992; Woodward, 1992).

Behavioural factors

These factors have been comparatively less studied, mainly because of the difficulty to find appropriate data about entrepreneurs and their personal circumstances. Figueiredo *et al.* (2002) compare location alternatives inside and outside the entrepreneur's area of residence and argue that exists a preference for the home base, the so-called "home bias", which may stem from personal factors, social capital, other non-transferable assets and imperfect information about the urban and regional environment. They find that some investors are willing to accept over three times higher labor costs to compete in their resident areas of business. In contrast, non-home location choices are governed by neoclassical factors, such as agglomeration economies and the proximity to major urban centres. Meester and Pellenbarg (2006) also find that actual location of a firm is the most important variable that determine the locational preference patterns; it is more important than sector, size of market area or company size. They also argue that the willingness of entrepreneurs to move to a certain region is not depending on the real qualities of a region but on their perception of those qualities. Besides, Arauzo and Manjón (2004) provide evidence that large and small firms follow different location patterns: whereas large firms seem to be mostly guided by objective (quantitative) factors, small firms seem to be mostly guided by the entrepreneur's (qualitative) preferences.

1.7.3. A note about the ambiguous results found in the literature

As Arauzo *et al.* (2010) show in a recent survey, regional economics literature has produced a number of ambiguous results. Audretsch and Fritsch (1999) argue that this owes to the omission that the link between geographic specific factors and the propensity to start new firms varies from industry to industry. They point out that most studies on new firm formation in different regions explain aggregated startups across all sectors, that is, the following model is estimated:

$$S_j = \alpha + \beta_{1j} X_{1j} + \beta_{2j} X_{2j} + \dots + \beta_{kj} X_{kj} \quad [9]$$

where S represents the new-firm startup rate in region j , and each X represents a region specific variable. It is implicitly assumed that each parameter has the same impact on startup activity across each manufacturing industry. This approach ignores that each regional variable may impact differently in the startup activity across industries. For example, unemployment may affect more to labour-intensive activities and academic research may impact more on high tech startups. In order to control for the industry when linking the influence of geographic specific characteristics to new-firm startup activity, Audretsch and Fritsch (1999) modify equation [9] so that:

$$S_{ij} = \alpha_i + \beta_{1ij} X_{1j} + \beta_{2ij} X_{2j} + \dots + \beta_{kij} X_{kj} \quad [10]$$

where S is the startup rate of new firms in industry i and in geographic region j and the parameters are allowed to vary across industries. Although the set of explanatory variables is still specific to a geographic region and not to any particular industry, each estimated parameter in the model becomes specific for each particular industry.

In addition, variations in the estimated parameters from equation [10] are not random but rather related to characteristics associated with specific industries. To determine whether the influence of a particular geographic specific variable on new-firm startup activity depends on the characteristics specific to the industry, these authors suggest estimating a second stage model:

$$\beta_k = \varphi_k + \varphi_{1k} Z_{1k} + \varphi_{2k} Z_{2k} + \dots + \varphi_{mk} Z_{mk} \quad [11]$$

where the dependent variable is the value of the estimated parameters from Equation [9], and the explanatory variables, Z_m are m industry specific variables which determine the response in the startup rate of a specific industry to a change in a geographic specific variable.

1.7.4. Recent Contributions on Firm Survival

Spatial issues have been recently included in firm survival research. The first papers that account for these factors as their main objective date back to the beginning of this decade (Fotopoulos and Louri, 2000a, for Greece, Baldwin *et al.*, 2000, for Canada, Honjo, 2000a and 2000b, for Japan)⁴⁶. They suppose that failure rates may be highly correlated with particular geographic areas or with firm location with respect to urban agglomerations. They account for regional/urban differences including dummies variables, which control for these effects on the hazard.

As studies on location, there are two ways to explain the impact of spatial effects on firm survival: i) from the viewpoint of the firm, including a dummy variable in order to refer the location or ii) from the viewpoint of the characteristics of the territory. Different studies also assess for the impact of locating in a particular region, urban area, local market area or even compare between urban and rural zones.

In their survey, Manjón and Arauzo (2008) argue that empirical evidence about the impact of spatial factors on survival is unclear. For instance, Fotopoulos and Louri (2000a) estimate the impact of the proximity to urban environments in survival and conclude that location in Greater Athens - versus the rest of the country- affects survival positively, especially for smaller firms. However, this is opposed to Fritsch *et al.* (2006), who show that hazard rates for Germany are higher in large cities and that population density affects survival adversely. Strotmann (2007) points out, for the same country, that firms located in rural areas have more chances to survive than those located in urban areas. Littunen (2000) discusses the Finnish case and he finds that survival is lower in environments that, in principle, provide more opportunities for entrepreneurs. A more developed production structure may lower entry barriers to all firms, even those who lack the skills necessary to keep the project alive. This explains why the hazard rate may be greater in urban than in other regions. At last, Fertala (2008) shows a non-linear relationship -inverted U shape- between hazard rates and agglomeration levels.

However, these studies differs significantly in regard to the type of firms included, the variables⁴⁷ analyzed, the econometric approach, the reason of exit and the characteristics of the

46 Previous studies explain the differences in labor productivity across regions. For instance, Ciccone and Hall (1996) estimate a model based on local geographical externalities and other one based on the diversity of local intermediate services. In both of them, spatial density results in aggregate increasing returns. They find a positive relation between county employment density and productivity at the state level in the U.S.

47 Studies that account for the spatial dimension on firm survival (Shane and Foo, 1999; Fotopoulos and Louri, 2000a; Honjo, 2000a and b; Fritsch *et al.*, 2006; Strotmann, 2007; Fertala, 2008) include, among others, the following variables: a) at the firm level: employees (as a proxy of size), age, firm employment growth, return on assets, obligations and long-term asset (debt level), ratio of fixed assets over total assets (liquidity constraints); multi-plant firm; ln from capital (financial strength); vertical integration b) at the industry level: sunk costs (contestability); sector; Herfindahl Index (concentration); growth of the sector turnover rate (demand); initial number of plants (market size); number of entries (dynamic sector); gross entry rate (competition and Barriers to entry); industry price-cost margin; excess-job-turnover (heterogeneity); high-tech sector; c) at the macroeconomic level: cohort or calendar years (economic cycle); macroeconomic growth; d) at the individual level: characteristics

country. The latter variable is particularly relevant in the context of this thesis project. For instance, Germany has an industrial structure which is very different from the Greek one: industry concentration is much lower and the infrastructure that links the metropolitan area with the rest of the country is better⁴⁸. Services characteristics and regional industrial policy may be different as well.

Even studies that are similar in terms of methodology and approach -for example, Fotopoulos and Louri, 2000a and Strotmann, 2007- but which are performed for countries with different levels of development, show opposite conclusions. Thus, economic, social and institutional differences between Germany and Greece might be important enough to modify the impact of locating near urban areas in the two countries.

Finally, the impact of regional variables may vary depending on the characteristics of the analyzed periods. For instance, Acs *et al.* (2007) empirically test the relationship between regional human capital stocks and new-firm survival among local market areas in the U.S. They find a positive relationship between the two variables for the period 1993–1995, which is not as strong for the recession period 1990–1992.

of the manager; e) at the spatial level: location (dummy variable); location * small size; urban or rural area; geographical concentration or agglomeration; number of entries in neighboring regions; population density; regional growth; regional employment share; regional unemployment rate; and business climate and institutional legitimacy.

48 The main contribution of these authors is that survival depends not only on regional and sectoral characteristics but also on the number of entries in neighboring regions. Thus, they provide evidence that spatial autocorrelation is an important issue to explain survival rates.

PART 2: FUTURE RESEARCH

2.1. Differences between developing and developed countries

Though firm dynamic processes respect certain regularities synthesized by Geroski (1995), they may acquire particular features depending on the degree of development of each country. First, Bartelsman *et al.* (2004) argue that in developing countries market structure and institutions are usually more distorted. For instance, it might be that different policies act to subsidize incumbents, or give them a preferential treatment, some procedures artificially increase the barriers to entry -such as poorly functioning financial markets and/or regulatory barriers-, while other policies make exits for some types of businesses more frequent -such as poorly functioning financial markets for young and small businesses-. However, the effects of these distortions are not clear. These authors hypothesize that countries -or sectors- where the creative destructive process is distorted in some manner will have less churning and lower productivity levels and productivity growth rates. That is, artificially high barriers to entry will lead to reduced firm turnover, increased incumbents survival probabilities, lower productivity⁴⁹ and less efficient allocation of resources.

But, in fact, developing countries generally exhibit higher rates of rotation. These authors find that total firm turnover is in between 3-8% in most industrial countries and more than 10% in some of the transition economies⁵⁰. There are also discrepancies between firm entry and exit across firm size among Latin American countries: while Mexico, Chile and Venezuela show vigorous firm turnover, Colombia and especially Argentina show less turbulence, closer to the values observed in some Continental European countries. They suggest also that institutional distortions might yield a larger gap in productivity between entering and exiting businesses. Given high barriers to entry, the average productivity of entrants will rise while the average productivity of incumbents and exiting businesses will fall.

Alternatively, some types of distortions in market structure and institutions might make the entry and exit process less rational, that is, less driven by market fundamentals but more by random factors. Such randomness would imply less systematic differences between entering, exiting and incumbent firms -in the extreme when all entry and exit is random there should be no differences between entering, exiting and incumbent businesses-.

Another related problem is that a business climate that encourages more market

49 Davis and Haltiwanger (1999) illustrate this prediction through a calibration exercise, using an extreme example where all reallocation is shutdown.

50 They calculate over firms with at least 20 employees to maximize the country coverage. Extending the tabulations to include also micro units increases total turnover to between one-fifth and one-fourth of all firms.

experimentation might have a smaller short run contribution from the creative destruction process. That is, market experimentation may be associated with more risk and uncertainty in the short run, so that it is only after the trial and error process of the experimentation has worked its way out -through learning and selection effects- that the productivity payoff is realized. Thus, a business climate that encourages market experimentation might have a lower short run contribution from entry and exit, but a higher long run contribution.

Besides, macroeconomic instability and the intense cyclical variations that characterize many developing countries, might induce patterns of entry and exit different from the ones observed in developed countries. A research carried out by Castillo *et al.* (2006) for industry, commerce and services firms in Argentina, shows that the process of birth and shutdown of plants is pro cyclical: rate of entry increases during the years of economic growth and decreases in recessive years. Equally, the rate of exit diminishes during expansive years and increases in the recessions. Thus, firm population grows during economic growth periods. These results contrast with those found for Portugal and Germany, where few evidence exists in respect to the effects that macroeconomic conditions have on the patterns of entry, exit and survival (Mata *et al.*, 1995; Boeri and Bellman, 1995). Besides, Caballero and Hammour (2000) point out that recurrent crises are an obstacle to creative destruction, specially because of the following tight financial-market conditions.

Another distinctive feature is that young companies usually have a relatively greater economic impact. In this respect, Argentinian firms younger than 10 years old concentrate twice the employment than their American counterparts. Symmetrically, mature firms in Argentina have a participation in the total employment (56%) substantially minor that the mature firms in the U.S. (79%) (Castillo *et al.*, 2006). That is because developed countries rely on a stabler managerial and consolidated structure, so that births, even in dynamic periods, represent a marginal portion of the employment (Davis *et al.*, 1997; Castillo *et al.*, 2002).

Finally, unlike developed countries, Latin American firms mainly innovate through imitation or incorporation of knowledge developed by other organizations. For this reason, Burachik (2000) holds that innovative entry is a very infrequent phenomenon in Latin American countries, where incumbents tend to enjoy advantages to incorporate technical progress, regardless relevant knowledge is external or internal to the firm. In most advanced countries, on the other hand, new and small firms enjoy an innovative advantage if relevant technological knowledge is codified and external to incumbent firms. In the same way, Amorós and Cristi (2008) argue that in Latin American countries most of the small-scale production firms have minor significance in innovation, and the products manufactured and the services provided are of discreet value added in comparison with the large and concentrated companies. Thus, these economies have a limited number of nascent ventures under the model of “entrepreneurial economy” because of the many restrictions present to create knowledge-

based businesses.

2.2. Empirical research about firm demography in developing countries

Despite the distinctive features of developing countries, there is little evidence about firm demography processes in them. Fritsch *et al.* (2006) find that factors that have a statistically significant effect on survival in East Germany are fewer than those ones existing in West Germany. This means that survival of new businesses in East Germany is subject to erratic influences to a greater extent than is true in the West.

Bartelsman *et al.* (2004) analyze the process of creative destruction across 24 countries -ten industrial countries, five Central and Eastern European countries in transition, and nine emerging economies in Latin America and East Asia- over the nineties. They combine data from these countries and find large differences across groups of nations⁵¹. In particular, Argentina resembles Continental Europe with smaller flows and less impressive post-entry growth of successful firms. Besides, they find also a positive cross-sectional correlation of entry and exit in most countries -including Argentina-, which confirms previous evidence (Geroski, 1991a; Baldwin and Gorecki, 1991; see for Argentina Castillo *et al.*, 2006) and suggests that entries and exits are largely part of a creative destruction process in which entry and exit reflects within sector reallocation⁵².

They also present simple survivor functions across countries and sectors and they observe an important country effect. Argentina has one of the smallest rate of survival, behind Mexico, UK and near Colombia in manufacturing and only behind Mexico in the total business sector. About 20% of entering firms fail within the first two years, and only 40% of firms that remain in the business after the first two years survive for five more years. At the sectoral level, Argentinian rate of survival -in 4 years- is lower than the average in every sector, except for Chemicals and Chemical Products. On the other hand, its survival rate is relatively lower in Office, Accounting and Computing Machinery and in Construction. Nevertheless, sectoral survival rate is in many cases more similar to industrial countries than to the other ones -as it is shown in Annex 1-.

They also perform a semi-parametric analysis of survival -Cox' proportional hazard model- and conclude that controlling for industry composition and for right-censoring reduces the country differences in survivor rates. Thus, Argentina seems more similar to Colombia and Chile than to Mexico. Besides, they show that Argentina has one of the most convex functions, which means that

51 They show that, while entry and exit rates are fairly similar across industrial countries, post-entry performance differs markedly between Europe and the U.S., which they interpret as a potential indication of the importance of barriers to firm growth as opposed to barriers to entry. Transition economies show an even more impressive process of creative destruction, while Mexico shows large firm dynamics with many new firms entering but also many failing rapidly.

52 Entry and exit are negatively correlated in some transition economies and in Colombia and Venezuela, which might reflect a greater role for sectoral profitability shocks in those countries (and/or might reflect measurement error).

exit rates are especially high for young businesses but decrease for older ones.

However, these authors mainly conduct an exploratory data analysis and they do not look for the determinants of the processes of firm demography. Besides, as their aim is comparing among different countries, they do not deepen into any particular country and, therefore, they do not analyze regional differences inside each nation.

In Chile, Liu (1991) analyzes firm demography to link entry-exit patterns to productivity, covering the period 1979-86. She wants to prove that competitive pressures really force inefficient producers to shut down. Thus, applying econometric techniques from the efficiency frontiers literature, she finds that competitive pressures force less efficient producers to fail more frequently than others. These gains suggest that microeconomic reforms -trade liberalization, privatization and market deregulation- have been effective in promoting efficiency improvements in the manufacturing sector. Similar results for Colombia are found by Eslava *et al.* (2005) over the period 1982-1998. They conclude that higher productivity, higher demand and lower input prices increase the probability of plant survival. Besides, they also find that trade liberalization increased plant exit, while other reforms decreased it.

As for Argentina, Castillo *et al.* (2002) study the evolution of industrial employment over the period 1995-2000. Thus, they analyze rates of employment creation and destruction, which involves not only entry and exit of firms, but also performance of survivors in terms of employment. They conclude that size, sector and age of the firms explain at least a part of firm performance in terms of job creation and destruction. In regard to size, smaller companies have gross rates of creation (24%) than tripled those of large companies (7%), and gross destruction rates that doubled them (26% versus 10%). As for sector, they find strong heterogeneity in firm behavior within the same industry. That is, in the same sector at the same time, many firms created jobs and many others destroyed them. Despite the more unfavorable activities are Radio, Television And Communication Equipment, Motor Vehicles and Textiles, the process of transformation that took place in the industry produce winners and losers in terms of employment generation in most economic sectors. Finally, firm age is also determinant: there is strong evidence of an inverse relationship between age of firms and gross flows (creation and job destruction) and the rate of job rotation. As the age increases, all these rates decrease. Besides, they also show significant behavior heterogeneity that can not be captured from the aggregated level of analysis, since in the same sector and at the same time, coexists job creation and destruction.

More recently, Castillo *et al.* (2006) perform a descriptive analysis of firm demography and firm performance -specially as regards the impact on employment-. They examine entry and exit rates for every economic activity and compare two periods: 1996-1998 and 2003-2005. Firstly, they highlight the importance of the economic cycle in the processes of firm demography. They also stress that the period 2003-2005 shows a growth pattern which is different from the previous expansionary

period (1996-1998), with a large number of new firms in all sectors: industry, commerce and services. This could be due to the change in relative prices -high real exchange rate-, which induces both an increase in the production of commodities as well as in industrial goods. However, they show that relative prices are not determinant. Despite at the sectoral level there is an increase in the rate of entry in activities favored by the new relative prices, entries focus on industries with lower barriers to entry.

Secondly, they verify a significant degree of heterogeneity and a high correlation between entry and exit within the same industry. This is why they argue that microeconomic factors -cost and demand conditions, barriers to entry, sunk costs, concentration level, learning effects and technical change- might have been also relevant in Argentina. However, they do not identify or analyze these factors.

2.3. Firm demography in Argentina

While Argentinian production structure is the result of processes that begin around the 30s, the current configuration is primarily due to new economic conditions prevailing since the 90s and the changes in recent years. In the nineties, along with the Convertibility Program, which establishes a system of fixed exchange rates between local currency and the U.S. Dollar, there are several structural reforms in the institutional and regulatory framework, which involve a radical reduction of tariff protection, a massive privatization of services and market deregulation⁵³. These reforms, plus a significant process of labor flexibility, cause the exit of many firms -specially the smaller ones, which cannot afford the new conditions- as well as the entry of other ones.

Following Kosacoff *et al.* (2000); Schvarzer (1997), Gatto and Ferraro (1997) and Yoguel (2000), the most significant changes in manufacturing in this period are: a) vertical disintegration of the processes, which has consolidated the pattern of production specialization of the 80s, oriented to natural resources and commodities, b) increased weight of foreign direct investment, c) a strong concentration process, induced by mergers and acquisitions; d) a increasing inter and intra sectoral structural heterogeneity; e) a larger weight of imports in domestic supply, which affects the production of durable goods and goods that are diffusers of technical progress; f) reduced rate of value added and greater capital intensity of production functions; g) the increasing adoption of technology products from external sources close to the technological frontier; h) diffusion of soft innovations; i) loss of importance of the linkages with local suppliers and subcontractors of capital goods and j) growing importance of internationalization strategies, but concentrated in a relatively small number of agents. Firm strategies to adapt to this new context are very different, and the significant increase in overall productivity is the result of the coexistence of two different situations: the offensive strategies of some

53 The process of market deregulation abolished many entry and exit barriers.

firms along with the defensive restructuring of other ones⁵⁴.

During this period, there is a significant growth in GDP, which reaches its peak in 1998, when a deep recession begins⁵⁵. Thus, the entry rate reduces permanently from 9.5% in 1996 to reach a minimum of 5.6% in 2002 (Castillo *et al.*, 2006). Unlike previous periods, the adaptability of firms to this scenario does not necessarily has to do with the industry in which they operate, but rather with their individual characteristics (Castillo *et al.*, 2002). In late 2001, internal economic crisis is exacerbated by the breakdown of the convertibility regime. The devaluation of local currency -more than 200%-, plus the shrinkage of domestic demand and the lack of credit, result in a significant increase in the levels of firm indebtedness and a significant number of closures.

Since 2003, macroeconomic stability, sustained high real exchange rate and the stimulated growth of aggregate demand settle down the base conditions to start a new growth process. Besides, the international context is also favorable: sustained demand, high prices for primary commodities and low interest rates (Fernández Bugna and Porta, 2008). Furthermore, devaluation implies the reduction of labor costs, which allows the reconstruction of the operating margins of firms. During this period, the birth of new firms is intense: entry rate is about 10.7% in 2003 and reaches its maximum of 14.6% in 2004. (Castillo *et al.*, 2006).

Unlike the previous decade, manufacturing is one of the most dynamic sectors regarding the generation of new jobs and the absorption of existing unemployment (Fernández Bugna and Porta, 2008). Nevertheless, a process of structural change in this sector is not registered: for example, Castillo *et al.* (2006) show that new relative prices are not enough to substantially modify the traditional structure of births. That is because firm's capacity of reaction to the new conditions is strongly conditioned to the experience of disarticulation and crisis undergone in the preceding decade.

2.4. Lines of research and objectives

This section outlines the objectives and main lines of research that will be developed in the next three years. Thus, three different proposals are briefly exposed: a) Spatial issues on entry and exit; b) Spatial issues on firm survival and c) Spatial issues on firm performance. Then, the first line of research is described in an initial proposal for the first research paper. It is divided into two parts: a descriptive analysis about regional differences on firm demography in Argentina and a project that

54 The so-called offensive strategies consist of the accomplishment of strong investments in machinery and equipment and deep organizational changes, while the defensive ones are based on the expulsion of employment and the realization of particular investments. Kosacoff (1998) identifies near 400 companies with offensive strategies, capable of reaching productivity levels close to the best international standards. They represent about 40% of industrial output in 1995. He also reveals the presence of 25.000 companies, that represent the rest 60% of the industrial product, characterized by the development of defensive strategies. Despite these ones raise their productivity level with respect to past, they are away from the international frontier.

55 The GDP decreases about 4% between 1998 and 2000.

involves an econometric specification.

2.4.1. Three lines of future research

The thesis will analyze firm demography in Argentina, which constitutes a clear novelty inside the empirical literature. As outlined in Section 2.1, firm demography may acquire particular features depending on the degree of development of each country and results may differ among them. However, literature has centered in cases as Europe, North America or Japan, with very few empirical contributions regarding countries out of these areas. Besides, since Argentinian provinces differ significantly in terms of mean wage, skill manufacturing activity, economic growth and other factors, the spatial issue is a central factor to be considered. To our knowledge, such a study has not yet been done.

The first line of research will be developed afterwards. Its main purpose is to explore the determinants of firm entry and exit in Argentinian provinces. The second line consists in exploring the determinants of firm survival, following a similar approach and methodology. In both cases, the data of firm demography come from the Employment and Business Dynamics Observatory (Observatorio de Empleo y Dinámica Empresarial, OEDE) from the Ministry of Labor, Employment and Social Security (Ministerio de Trabajo, Empleo y Seguridad Social, MTESS), while the data about regional and sectoral variables come from different sources, described in Section 2.5. Finally, last line of research aims to explain differences in regional firm performance. In this case, panel data from Fundación Observatorio PyME and repeated cross section data from MAPA PyME will be used (see Section 2.5). Thus, in the three papers, we should be able to identify the influences on the success, failure and survival of newly founded establishments that are specific to the particular industry, region and period of time.

2.4.2. Spatial issues on firm entry and exit in Argentina: Descriptive analysis

Since the main objective of the thesis is to analyze spatial differences in firm demography it is necessary to evaluate first the magnitude of such differences and to summarize them in some way. Thus, we propose a initial descriptive analysis, which will describe: a) regional heterogeneity in a somewhat static analysis and b) the evolution of regional heterogeneity, assessing whether the regional differences increase or decrease.

Regional heterogeneity: questions and objectives

We expect to be able to answer the following **questions** regarding to regional heterogeneity:

1. Is there heterogeneity among Argentinian provinces in terms of:
 - firm entry and exit rates⁵⁶?
 - registered employment *per capita* or share of registered employment on total employment⁵⁷?
 - impact of entry on total wage employment? -penetration entry rate-
 - firm mobility to other size stratum⁵⁸?
2. Is this heterogeneity related to the industrial specialization in each province? Is it related to current industrial production regimes⁵⁹?

Thus, we pursue the following **objectives**, referred to the initial and the last year of the period (2003-2008) and to industrial, commerce and service firms:

1. Describing, assessing and explaining the degree of regional heterogeneity in relation to:
 - firm entry and exit rates;
 - registered employment *per capita* or share of registered employment on total employment;
 - impact of employment generated by entries on the total wage employment;
 - firm mobility to other size stratum.
2. Building typologies of entrepreneurial behavior, that is, grouping provinces with similar behavior in terms of firm demography. For example, provinces with low mobility and low growth, provinces with high mobility and low growth, provinces with high mobility and growth, provinces with high growth and low mobility.
3. Building typologies of firm mobility and compare them with regional profiles of industrial specialization.

Evolution of regional heterogeneity: questions and objectives

The aim is analyzing the evolution of the gap of different indicators for each province in

56 Entry and exit rates will be calculated following the different approaches exposed in Section 1.2: a) the one related to labor market, b) the one related to the population, c) and the ecological approach. Thus, we will be able to asses whether the results vary depending on the approach used.

57 In Argentina, the share of registered employment may be used as a proxy of the degree of regional development.

58 Firm mobility will be assessed through transition matrix, that is, tables that show -for each region- the share of firms that are small (medium/large) in the initial year and remain in the same stratum in the last year of the period, the share that become medium (small/large) an the share that become large (small/medium).

59 There are five Argentinian provinces favored by these regimes: San Juan, San Luis, Catamarca, La Rioja and Tierra del Fuego. This national economic policy, aimed at encouraging the establishment of industries in certain regions, is regulated by Law 22.021 and Decree 804/96, and it is based on tax deferments and exemptions for investments in factories located in these regions.

relation to one or more provinces taken as a reference, that is, whether the gap increases or decreases. In this case, the evolution will be assessed between the initial and the last year of the period 2003-2008 -what is called the growth period- and between 1996-2001 -which is called the convertibility period-. Once again, it will refer to industrial, commerce and service firms. Some indicators that might be used are:

- Registered employment on total employment
- Registered employment on total population
- Amount of registered wages *per capita*, as a proxy for productivity⁶⁰.

We expect to be able to answer, among others, the following **questions**:

1. How did the gap between different provinces evolve in the convertibility period as well as in the growth period? Does economic growth tend to increase or to diminish the gap?
2. How do the processes of firm demography operate for this to happen? For instance, how did entry and exit evolve by size stratum?
3. How did the processes related to firm demography evolve in the successful cases? Is it possible to recognize other determinants?

Thus, we pursue the following **objectives**:

1. Identifying, describing and explaining the evolution of the gap between provinces regarding to the following indicators:
 - Registered employment on total employment;
 - Registered employment on total population;
 - Amount of registered wages *per capita*.
2. Describing and explaining the evolution of these gaps.
3. Building typologies of heterogeneity evolution and comparing them with regional profiles of industrial specialization.

2.4.3. Spatial issues on firm entry and exit in Argentina: Econometric specification

The **objective** is to explore the determinants of firm entry and exit in Argentinian provinces. Panel data -from 2003 to 2008- will be used to estimate the determinants of firm entry and exit in each province, according to: i) sectoral variables; and ii) characteristics of the territories - unemployment, industry growth, human capital, entrepreneurial attitude, specialization index, population density, etc.-.

60 The indicator could be: $(\text{employees region } i / \text{population region } i) * (\text{average salary of employees region } i / \text{Average wage employees})$. Collective bargaining could distort this measure, since some groups of workers may have higher minimum wages without having therefore a higher productivity.

A similar analysis may be carried out for the period 1996-2001, which is very different in regard to macroeconomic conditions. Results may be compared as well.

Panel data estimation has been used in recent literature on firm demography (Gaygisiz and Köksal, 2003; Kangasharju, 2000), and one of its main advantages is that non-observable heterogeneity can be controlled. According to the working plan exposed in Section 2.6., the exact specification, the statistical contrasts and the econometric methodology -which include whether estimate through fixed or random effects, the evaluation of specification errors and the inclusion of latent variables- are included in Phase 2 of the project. Besides, as Audretsch and Fritsch (1999) point out, each regional variable may impact differently in the startup activity across industries. Thus, it is necessary to analyze how to control for the industry when linking the influence of geographic specific characteristics to new-firm startup activity. That is, we have to figure out which of the models proposed in Section 1.7.4 will be used.

An alternative to the regional approach is the urban-size approach, which is based on the assumption that external economies are not homogeneously distributed in the regions, but are instead related to urban size (Arauzo and Teruel, 2005). However, in spite of its relevance, the data required to carry out a similar research are not available at the time of this writing.

2.5. The available statistical sources

Information about start-ups and their survival is generated by the Employment and Business Dynamics Observatory (Observatorio de Empleo y Dinámica Empresarial, OEDE) from the Ministry of Labor, Employment and Social Security (Ministerio de Trabajo, Empleo y Seguridad Social, MTESS). The data cover all private sector firms with at least one employee and are available at two-digit industry detail and one-letter services detail, for all Argentinian provinces⁶¹ (23) and Capital Federal. This accounts for about 40% of the total employment in Argentina -the rest 60% corresponds to public and informal employment-. Though, registered private sector is the one with higher productivity. It represents the most up-to-date, comprehensive, reasonably long-term and spatially disaggregated data source currently available for firm demography studies. Besides, this database identifies changes in the firm codes that do not reflect market entries and exits. That is, spurious entries and exits are identified through a procedure called "tracking employment", which consist of identifying the displacement of the whole personnel from firms that "exit" to "new" firms.

We count with aggregated data of firm entry, exit and incumbents, divided into: a) 4 sizes - large, medium, small and micro-, b) 50 economic activities -from industry, commerce and services-, c)

61 Buenos Aires Province is disaggregated into Conurbano Bonaerense and Rest.

25 geographical areas, d) local/non-local firms⁶². For each category we have information about number of firms and the employees they represent, quarterly, from 2003 to 2008. This implies a total of 43.560 records⁶³.

On the other hand, information about employment and qualification is taken from the Household Permanent Survey (Encuesta Permanente de Hogares, EPH), performed by the National Institute of Statistics and Census (Instituto Nacional de Estadísticas y Censos, INDEC). Other indicators are based on publications of public and private institutions, such as Argentinian Industrial Union (Unión Industrial Argentina, UIA), regional statistical bureaus, National Census, among others.

Besides, information about regional differences in firm performance, as well as the strategies of the firms, is from Fundación Observatorio PyME⁶⁴. Despite some questions may vary among the different questionnaires, panel data over the period 2004-2007 are available. They are referred to industrial firms between 10 and 200 employees. The forms include information about general characteristics of the firm, quality certifications, problems and expectations, investment, innovation and technology, performance, human resources, financing, accounting data and public policy. The sample is representative at regional and sectoral level.

Finally, the survey called MAPA PyME is undertaken, since 2003, by the Subsecretary for Small and Medium Enterprises and Regional Development (Subsecretaría de la Pequeña y Mediana Empresa y Desarrollo Regional, SEPYME) and it aims to provide dynamic qualitative as well as quantitative information about SMEs. The survey inquires -twice a year- about issues such as number of employees, investment, financing, income and expenses, production capacity, foreign trade and public policy. In some periods it also includes some special chapters about technology, training, quality certifications, environment, corporate social responsibility, research and development and innovation. The following firms have not been included: plants that belong to large firms, foreign groups, non-profit institutions, auxiliary units, public sector, farming activities, fishing, mining, electricity and gas, construction and the sectors which have more than 90% of firms with less than 5 employees. The country is divided into 41 geographical regions and the sample is representative at the regional level as well as at each activity defined as relevant in each region. Since the survey aims to provide information about the economic activities that are considered *a priori* as more relevant in each region, the regional samples may not be homogeneous in terms of the detail of the activities.

62 A local firm/plant is that one that operates in the same province in which it was founded. On the contrary, a non-local firm/plant operates in a province which is different from its birth province. It may be a relocalization or a plant that belongs to another firm.

63 Similar information over the period 1996-2001 will be available as well.

64 This is a nonprofit organization founded by the Università di Bologna, Techint Organization and the Argentine Industrial Union. Its aims is to collect updated information on small and medium enterprises and to develop proposals for decisions on public policy and private action. <<http://www.observatoriopyme.org.ar>>

2.6. Working plan

We plan to perform one paper for every year of thesis, following the lines of research exposed in Section 2.3. Each one will be divided into three phases, which are detailed in Table 1.

TABLE 1: WORKING PLAN

Activities-Tasks //	Month	O	N	D	E	F	M	A	M	J	J	A	S
FIRST PHASE: Construction of the analytical frame													
Literature review (theoretical framework)		X	X										
Literature review (modelling)		X	X	X	X	X							
Literature review (applications)		X	X	X	X	X							
Search of statistical sources		X	X	X	X	X	X						
SECOND PHASE: Contrast of assumptions and design of applications													
Descriptive analysis				X	X	X	X	X					
Design and elaboration of the statistical contrasts							X	X	X	X			
Design and elaboration of the econometric methodology.								X	X	X	X		
Construction of the data bases.									X	X	X		
THIRD PHASE: Results, extensions and implications of political economy													
Estimation and evaluation of the specifications										X	X	X	
Analysis of the results and implications of political economy										X	X	X	
Diffusion of the results											X	X	X

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Annex 1: Survival rate across countries and industries

Table A comes from Bartelsman *et al.* (2004) and provides details on the survival rates at age four across industries and countries of Latin America. The first column presents the cross-country average survival rate for each industry; the second and third columns report the deviations from this average for industrial and other countries respectively; while the other columns present the deviations for each country individually. Notably, there is variation even across Latin American countries. Besides, shaded cells indicate that Argentinian sectoral survival rate is in many cases more similar to industrial countries than to the other ones.

TABLE A: SURVIVAL RATE (4 YEARS OF AGE) ACROSS COUNTRIES AND INDUSTRIES
(AS A RATIO TO CROSS-COUNTRY SECTORAL AVERAGE)

	Cross country average	Industrial countries	Other countries	Argentina	Chile	Colombia	Mexico
Mining And Quarrying	0.69	1.05	0.94	0.84	s/d	s/d	0.69
Total Manufacturing	0.67	1.00	1.00	0.89	1.04	0.87	0.76
Food Products, Beverages And Tobacco	0.69	1.02	0.98	0.86	1.03	0.95	0.80
Textiles, Textile Products, Leather And Footwear	0.59	0.96	1.03	0.91	1.08	0.87	0.80
Wood And Products Of Wood And Cork	0.64	1.04	0.97	0.83	1.13	0.77	0.69
Publishing, Printing And Reproduction Of Recorded Media	0.69	0.98	1.01	0.93	1.09	1.02	0.77
Coke, Refined Petroleum Products And Nuclear Fuel	0.73	1.05	0.96	0.83	0.93	1.11	0.92
Chemicals And Chemical Products	0.69	1.02	0.99	1.02	1.00	1.00	0.86
Rubber And Plastics Products	0.73	0.98	1.01	0.94	1.02	0.90	0.81
Other Non-Metallic Mineral Products	0.68	1.02	0.98	0.89	0.98	0.83	0.74
Basic Metals	0.69	0.99	1.01	0.90	1.13	0.92	0.78
Fabricated Metal Products, Except Machinery And Equipment	0.69	1.01	0.99	0.85	1.00	0.82	0.70
Machinery And Equipment, N.E.C.	0.73	1.01	0.99	0.86	0.97	0.75	s/d
Office, Accounting And Computing Machinery	0.70	0.88	1.10	0.60	1.42	1.42	s/d
Electrical Machinery And Apparatus, Nec	0.74	0.93	1.06	0.93	1.14	0.98	s/d
Radio, Television And Communication Equipment	0.71	0.92	1.08	0.86	1.06	1.04	s/d
Medical, Precision And Optical Instruments	0.77	0.96	1.04	0.99	1.04	0.81	s/d
Motor Vehicles, Trailers And Semi-Trailers	0.70	0.99	1.01	0.95	0.96	0.83	0.81
Other Transport Equipment	0.65	0.98	1.01	0.83	0.88	0.88	0.76
Manufacturing Nec- Recycling	0.66	1.02	0.98	0.89	1.07	0.78	0.70
Electricity, Gas And Water Supply	0.82	1.01	0.99	0.95	s/d	s/d	0.88
Construction	0.64	1.07	0.94	0.66	s/d	s/d	0.32
Market Services	0.66	1.02	0.98	0.89	s/d	s/d	0.73
Wholesale And Retail Trade- Restaurants And Hotels	0.64	1.02	0.98	0.87	s/d	s/d	0.74
Transport And Storage And Communication	0.66	0.98	1.02	0.98	s/d	s/d	0.78
Finance, Insurance, Real Estate And Business Services	0.70	1.01	0.99	0.91	s/d	s/d	0.75
Total non-agricultural business sector	0.65	1.02	0.99	0.88	1.07	0.90	0.67

Source: own elaboration based on Bartelsman *et al.* (2004)