CORPORATE GROWTH, AGE AND OWNERSHIP STRUCTURE: EMPIRICAL EVIDENCE IN SPANISH FIRMS

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Abstract. The objective of this work is to analyse firm mobility among the different sectors of the Spanish economy according to a statistical classification of economic activities at the 1-digit level. Some of the stylised facts that we find are: an inverse relation between firm growth and age; an increase in new entrants' average relative size in terms of sales compared to established firms among the different industries and cohorts; the importance of the firm's initial size in entrepreneurial activity; the favourable impact of the economy on firm growth; and a positive relation between non-concentration in the ownership structure and greater mobility. In this context, an efficient corporate governance system may prove as a significant policy tool for the investment and growth prospective of the Spanish economy. The regulatory framework of the Spaniard capital market has been coordinate with the EU standards. The challenge is now mostly for the firms to adopt the appropriate corporate governance structures, in order to achieve real convergence, in terms of productivity and competitiveness, with other developed economies.

Keywords: Corporate growth, firm age, mobility, economic growth, ownership structure, Spanish firms.

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1. Introduction

The concept of corporate mobility refers to the process of entry into and exit from markets of firms and their units. This flow has been one of the most useful means of explaining the evolution of companies and their adaptation to their environment. All this has been the object of much attention from the theoretical perspective, but it has not had the equivalent empirical attention until recently, perhaps due in large part to the difficulty of measuring it statistically as Baldwin, Geroski (1989). In particular, most research on firm turnover and the factors characterising it focuses on the industrial sector, where authors such as Dunne *et al*. (1988), Acs and Audretsch (1990), Baldwin

(1995), Sutton (1997), Caves (1998), Arauzo and Segarra (2005), Rinaldi (2008) find certain regularities in the dynamics of firms in markets.

Market entry and exit of firms or units is an interesting way of observing the evolution and adaptation of these productive units to their environments. In this respect, the literature appears to indicate that although the theoretical perspective has been object of attention, the empirical aspect has been somewhat neglected, with analysis of firm creation and survival concentrating on manufacturing sectors.

In this context, the objective of this work is to analyze corporate mobility among the different sectors of the Spanish economy (according to their 1-digit CNAE codes[1], comparing new entrants (ex novo) and established firms. Within this process of firm mobility analyzed in this work, we attempt to provide answers to the following questions: i) how do firms enter markets according to the different annual cohorts and considering the sector of activity? In this respect, we consider the size of the new entrants compared to the size of the established firms. This leads us to ask: ii) can we explain the firms' evolution after entering the market (post-entry behavior? If yes, do firms of different sectors, ages or growth rates behave similarly? iii) In terms of firms' evolution in their markets, do small or medium-sized firms grow faster than large ones? Is the age of the firm a determinant of its dynamics? From work such as that of Evans (1987) and Hall (1987) we observe the existence of a positive relation between a firm's size and its probability of survival.

There have been relatively few studies tackling these questions in general terms and in particular for the case of Spain until recent times. In consequence, we class this work among the group of novel analyses necessary to understand the corporate spirit in Spain. If there are not many empirical works studying topics relating to firm creation and consolidation, there are even fewer analyzing the behavior and trajectories of firms beyond the initial period of mortality of young firms.

Analyzing the questions posed in this work about the behavior of firms entering or exiting markets or established firms, as well as the factors that characterize them, should help company managers understand not only how the resources and capabilities in terms of size and accumulated experience evolve in a sector of activity, but also how they best adjust under the perspectives of both new entrants and established firms.

This work is organized as follows: in the second section we present the theoretical literatures in corporate dynamism. The third section is concerned with the data. Section 4 describes empirical analysis and results, beginning first with the characteristics of the new entrants, comparing new entrants and established firms in function of the sector of activity. The section closes with the growth of the established firms, its relation with their age and size, and the firm's mobility and transition between sectors. Finally in Section 5 we provide a summary of the most relevant conclusions.

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[1] Spanish equivalent of the European NACE classification of economic activities.

2. Theoretical literatures in corporate dynamism: mobility and transition

The different theories on corporate mobility provide us with guidelines in our attempt to answer the previous questions. For example, the theory of passive learning, with Jovanovic (1982) as its strongest supporter. The main argument in this approach is that firms do not a priori know their own cost structures. If this proves to be competitive, the firms will survive; if in contrast their costs exceed the average of the established firms, they will end up exiting the market.

From active learning theory[2] (Ericson and Pakes 1990; Hopenhayn 1992), firms can change their characteristics during their time in a market, consequently varying their chances of survival. The causes of these changes can be of various types: technological, organizational, etc.

In contrast with the importance that firm mobility has for explaining market functioning, there are still many fields to explore. Dunne *et al*. (1988) indicate the lack of studies analyzing patterns of behavior of firms entering or exiting markets and the post-entry behavior (performance) of the new firms in terms of analyzing the characteristics/skills necessary for survival and growth. In turn, Schoenecker and Cooper (1998) point out that in spite of the strategic interest of the issue there has been remarkably little attention paid to the types of firm that enter markets and when they do so.

According Bentzen *et al*. (2006), the extensive empirical literature on the validity of Gibrat's law does not in general verify the law as it finds that firms' growth rates are negatively correlated with both firm size and age. However, some studies find that Gibrat's law holds for sub-samples of firms such as large firms or firms belonging to special industries. It has been pointed out that these results are due to the fact that the likelihood of firm survival for natural reasons is positively related to firm size and age. Whit a representative sample of Danish firms this study evaluates the validity of Gibrat's law for different kinds of firms over the period 1990 – 2003. In contrast to the majority of earlier studies this analysis corrects for the bias in the estimations by using variables related to the survival of small firms.

Manjon and Arauzo (2008) find that, in retrospect, the econometric specifications used in this area have progressively become more sophisticated, addressing issues such as discrete time, unobserved heterogeneity and competing risks. These authors identify a number of firm- and industry-specific covariates that provide largely consistent results across samples, countries and periods. According Manjon and Arauzo (2008) the evidence is less clear-cut with regard to ownership and spatial factors.

Finally, De Jorge *et al*. (2010) have investigated the determinants of firm size. Data was collected in face-to-face structured-questionnaire interviews of 1314 firm founders from

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[2] A third explanatory model concerns adjustment to external shocks. For this type of model, entries and exits are seen as the firms' response to external shocks affecting the market. This is an approach to the phenomenon centring on the explanation of the intense movements occurring in the population of firms every so often, and not on the continuous flow of entries and exits commonly observed in markets, as in the other two types of model.

14 counties in Argentina. The results show that the main sets of explanatory variables related to founder characteristics (age, experience, education, and vocation) provide a full explanation of firm size. It has also found evidence that a high degree strategic planning and a better competitive position are positively related to firm size as well.

In essence, most recent work on firm mobility takes on one of following two perspectives according Sutton (1997): (1) Firms' chances of survival depending on their age, size and other individual characteristics; and (2) Firms' growth in function of their age, size and other individual and sectorial characteristics. For example Arauzo and Segarra (2005) explore the determinants of firm start-up size of Spanish manufacturing industries. Their results indicate that the variables that characterize the structure of the market, the variables that are related to the behavior of the incumbent firms and the rate of growth of the industries generate different barriers depending on the initial size of the entrants. Arauzo and Segarra (2008) conclude that the industries' barriers to entry affect the ability of potential entrants to enter the markets and the size range at which they decide to enter. On the other hand, several studies have analyzed entry in developed capitalist economies coming to the conclusion that entrants are usually smaller, less productive and at higher hazard than incumbents. For example Rinadi (2008) considers if this was the case also in the rather peculiar situation of those firms which entered during the period of transition from planned to market economy, in one of the ex-soviet countries. Additionally Rinadi (2008) considers whether or not the uncertain environment generated by transition did activate a process of entry, as situations of uncertainty are generally supposed to do. The main result of this paper is that despite the fact that incumbents were firms created and organized to meet the objectives of the soviet regime, they were not outperformed by subsequently-created firms which were formed to match the needs of a transitional/quasi market economy. These results do not support "vintage" and "liability of obsolescence" models which suggest that new comers are better fitted to match new conditions.

3. Data

As Velasco (1998) points out, the first certainty when trying to understand the reality of firm creation in Spain is of moving in a world of statistical uncertainty. This situation also applies in other European countries, hindering any international comparison. Spain is not unaffected by this problem: while some databases allow a partial analysis of some interesting phenomena such as survival or creation by means of representative samples, these same databases do not allow study of the causes or factors behind business success or failure. That is, it is not possible to use a statistical source to make a clear and direct analysis of firm creation. One of the problems is to determine whether the firm is a new creation, or whether it is simply a new operational unit set up by an existing firm.

The sources of data most used by studies on corporate dynamism in Spain are the industrial survey of the Spanish National Statistics Institute (INE) for the period 1978–1992 and the Register of Industrial Establishments (Spanish Ministry of Industry and Energy). There have been recent attempts to mitigate the lack of databases suited for the analysis

of corporate dynamism, among which we might mention those developed by the Spanish Chambers of Commerce, Industry and Navigation and the INCYDE Foundation (Cámaras de Comercio 2001), or the research group from Rovira y Virgili University, based on INE's Central Directory of Firms (DIRCE).

In spite of the possibilities offered by this database to study the causes of firms' exit from markets, entry rates, etc., the current work uses the SABI database for its analysis. This database collects data on more than 180.000 firms (population) inscribed in the Mercantile Register (BORME), covering all sectors of business activity in Spain. One of the competitive advantages of this database is that it allows researchers to use variables relating to firm management.

The database we use here holds data on the main Spanish firms. It is highly representative of firms from the 18 Spanish autonomous "communities" (i.e., regions) that present their accounts in the Mercantile Registers. From the total population of more than 180,000 firms, we have taken random samples, as described in each of the following sections, on the basis of variables chosen in function of the objectives of the research. The unit of analysis is the newly-created firm for the case of the new entrants in markets.

The statistics of Table 1 (see Appendix 1) show some relevant data. The age of the firms considered in this panel is on average 13.6 years, which implies that the firms are in general relatively young, with some exceptions[3]. The average size, measured by number of employees, ranges from 25 employees in 1996 to 37 employees in 2001, which indicates that the sample has a significant number of small and medium-sized firms (SMEs)[4]. This implies that the sample closely approximates a real market structure, although logically we have also considered large firms within the sample. Another of the big databases refers to the analysis of the new entrants in relation to the sectors of activity (see Appendix 2, 3).

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[3] The age of the SMEs, according to the European Business Study (Maroto 2001), is based on a sample of firms that are generally more than 15 years old, among which however the firms of Portugal, Spain, France and Greece appear to be younger. The statistical sources used from the SABI database, which holds information about firms from the BORME (Official Gazette of the Mercantile Register), has introduced biases into the analysis. For example, the minimum level of turnover of the firms observed and retained in the database is set at €479.041. However, this limitation has certainly turned into an advantage when analyzing the firms and their evolution over time, as long as they survive beyond the initial stage of approximately three years of life.

[4] In the above-mentioned European Business Study there appears to be a relation between on the one hand the variables average firm size and dominant size class of the firms in each country, and on the other the competitive position occupied by the countries at the international level. In the most competitive countries we find Finland, the Netherlands, Sweden, Ireland and Denmark, with a total of 1,280,000 firms, the average size of firms ranges from 5 to 12 employees per firm (20–40 companies per 1,000 inhabitants), the predominant structure is the large firm, and SMEs provide from 60 to 70% of total employment. In contrast, in less competitive countries such as Portugal, Italy, Greece, Spain and France, with a total of 10.085.000 firms, the average size is smaller, between 3 and 7 employees per firm (60–70 firms per 1.000 inhabitants), the predominant structure is the micro firm, and SMEs generate more than 80% of total employment.

4. Empirical analysis and results

According Dunne *et al.* (1988) the importance of firm entry and exit as determinants of market characteristics is widely recognized. In this section we carry out an empirical analysis to respond to the questions posed in the introduction[5]. In this respect, this work makes various contributions to the empirical literature on firm growth.

In the next sections, we examine the relation between growth and age. This relation is important because some theories of firm growth predict particular patterns of growth depending on the stage in the firm's life cycle. We find that firm growth declines with age. This inverse relation between growth and age is consistent with Jovanovic's (1982) theory of firm growth, in which firms discover their true efficiencies over time in a process of Bayesian learning.

Also, we examine the relation between firm growth and age for various types of firm, considering the characteristics of the sector of activity. We find that growth declines with the size of the firm for relevant samples. This result is equally important, because some theories (Simon and Bonini 1958; Lucas 1978) and special cases of Jovanovic (1982), among others, assume or suggest that firm growth is independent of size, as postulated by Gibrat's law. It is precisely the variable firm age that has served as a support in our attempt in this research to explain the effects of growth. In this respect, Evans (1987) indicates that from the theoretical point of view studies designed to incorporate age can be expected to make an important contribution to the literature. This author also recommends caution in the use of Gibrat's law[6] to explain the distribution of firms by size, as does Lucas (1978). Authors such as Evans (1989), in the line of research of empirical work, suggest the importance of age as a determinant factor of dynamic industries.

4.1. Characteristics of new entrants

Understanding what happens to firms after entering a market is an issue of some interest, given that the effects of firm mobility on the sectorial structure depend not only on the number of firms entering or exiting the market at any given time, but also on their evolution in the market where they operate. It is particularly important to understand the rate at which firms disappear and how they gain market share. The scarcity of studies to the present day reflects the difficulties new entrants have surviving in markets, since they are generally small (Geroski 1991).

What patterns of growth do Spanish firms entering markets display in the different cohorts? If we can identify a particular pattern, do all the cohorts of firms behave similarly in their growth?

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[5] Some work that has served as reference includes: Boeri and Cramer (1992), Boeri and Bellmann (1995) for firms operating in Germany; Du Reitz (1984) for Sweden; Mata (1993), Mata and Portugal (2000) for Portugal; Geroski (1991) for the US; and Baldwin and Geroski (1989, 1999) for Canada.

[6] Gibrat's law or rule permits the construction of models of the distribution by size of the firms making up a particular market. This law has been frequently used in empirical work, but the results are in some cases contradictory.

The theories explaining firm entry into markets are conceived from a static or dynamic perspective. The first type establishes a direct relation between the new entrants and sectorial barriers. In this respect, the entry rate is positively associated with firms' expectations of potential profits and negatively associated with the profits sustainable in the long term, which are in turn related with sectorial characteristics. Geroski (1991) proposes that the entry rate of firms in a sector is related to the expected profits and the sectorial variables generating barriers to entry, and that these are influenced by the speed of response of the firms. On the other hand, the dynamic approaches explain firm mobility in terms of innovation-imitation processes, asymmetries in the expectations and the generation of economies of learning.

As can be seen in Fig. 1, the different cohorts evolve similarly in their sales[7] aggregating the sectors.
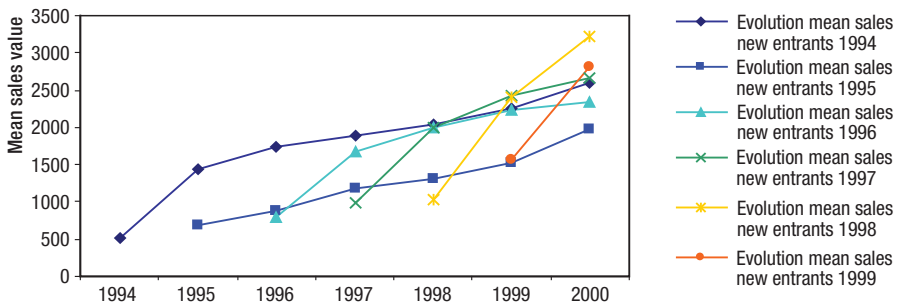
Fig. 1. Evolution of average sales values of cohorts

Thus the growth of the new entrants in the sample appears a priori to indicate interesting expectations for the future. This year-by-year evolution of the new entrants shows greater rates of evolution. Is the growth similar for the different cohorts (post-entry behavior)? How are the starting size and the post-entry evolution related?

Taking as basis Nelson, Winter's (1982) model and Evans (1987) in relation to the growth rate (dependent variable), which will be developed in the study of the established firms' growth, we propose in equation (1) the following explanatory specifications of the model of new entrants:

$$\text{Growth}_i = \left[S_{t*} - S_{ti} / t^* - t_i \right], \tag{1}$$

where:s represents the net sales turnover in thousands of euros; t^* is the final year of the firms under analysis, corresponding to 2000; t_i is the entry year of the firms, between 1994 and 1999; finally, $t^* - t_i$ is the difference between the final year and the initial year for each cohort.

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[7] In general firms' sales volume (in thousands of euros) has been the most used variable in this current work, both to measure size and growth. The reason for this lies in the fact that this variable is the most representative in the SABI database. In particular, it achieves 40% more year-observations than the level of employment. On the other hand, in much of the literature on entrepreneurs, as Autio *et al*. (2000) point out, "and even the growth in sales has allowed us to distinguish what is and what is not entrepreneurial activity".

The growth is analyzed for newly-created firms (*ex novo*). We cannot distinguish any merger processes that may have occurred, and hence neither can we determine by which means the growth was achieved, whether internally or externally[8].

Starting from Equation (1), the following regression models the growth of the new entrants by cohorts:

$$\left[\ln S_{t*} - \ln S_{ti} / t^* - t_i \right] = \beta_0 + \beta_1 \ln S_{ti} + \beta_2 \ln S_{ti}^2 + \sum_0^{10} \beta_3 \operatorname{Sec} + \varepsilon_{ti}, \qquad (2)$$

where: S_{ti} measures the sales of the year of entry into the market in the cohort being considered; S_{ti}^2 represents the term of the quadratic evolution of the sales; and Sec is a dummy sector variable (10 sectors, according to the 1-digit CNAE code). Although this was the final model chosen, in Table 1 we compare the results achieved with different alternative models, considering cumulative growth rates or not, and including logarithms in the independent variables or not. In this respect, the models incorporating logarithms are statistically significant in all the variables considered, and in particular the quadratic form obtains better goodness of fit coefficients for all cohorts.

The results of estimation 2 are shown in Table 2. As can be seen, the new entrants in the cohorts 1996, 1997, 1998 and especially 1999 experience higher growth rates with greater size. This can also be observed in the descriptive analysis of the distribution of the growth (see Appendix 3). In terms of elasticities, when there is an increase in the entry size of firms of 1% the growth evolves particularly from the cohorts of the year 1996 onwards. This growth is particularly important for cohorts 1998 and 1999.

Table 1. Comparison of models of new entrants

Year cohorts	Quadratic without Log. (absolute rate) $(S_f - S_i)/S_i =$ $S_i + S_i^2 + $ d_sect	Quadratic with Log. (relative rate) $(\operatorname{Ln} S_f - \operatorname{Ln} S_i)/t_f - t_i =$ $\operatorname{Ln} S_i + \operatorname{Ln} S_i^2 + $ d_sect	Linear with Log. (relative rate) $(\operatorname{Ln} S_f - \operatorname{Ln} S_i)/t_f - t_i =$ $\operatorname{Ln} S_i + $ d_sect	Linear without Log. (absolute rate) $(S_f - S_i)/S_i =$ $S_i + $ d_sect
	R^2	R^2	R^2	R^2
1994	non-sig (coef S_i^2)	0.26**	0.23**	0.04**
1995	non-sig (coef S_i^2)	0.24**	0.20**	0.14**
1996	0.40**	0.65**	0.57**	non-sig (coef S_i)
1997	non-sig (coef S_i^2)	0.67**	0.58**	0.78**
1998	0.11**	0.68**	0.59**	non-sig (coef S_i)
1999	0.70**	0.73**	0.57**	non-sig (coef S_i)

Note: S = sales

Source: Author's calculation.

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[8] However, this problem may not contaminate the final results, since the average size of the firms, as can be seen in Table 2, does not exceed 30 employees. An analysis carried out by Hall (1986) in the food sector finds that mergers and acquisitions make up some 13% of all disappearances from the database for firms of more than 20 employees.

Table 2. Results of Model 2

	1994		1995		1996		1997		1998		1999	
	Est. coef.	Std. error	Est. coef.	Std. error	Est. coef.	Std. error	Est. coef.	Std. error	Est. coef.	Std. error	Est. coef.	Std. error
constant	0.95	0.07**	1.04	0.06**	1.90	0.04**	2.67	0.06**	3.81	0.07**	7.24	0.18**
$\operatorname{Ln} S_i$	−0.20	0.02**	−0.20	0.01**	−0.42	0.01**	−0.55	0.01**	−0.82	0.02**	−1.98	0.08**
$\operatorname{Ln} S_i^2$	0.01	0.00**	0.01	0.00**	0.02	0.00**	0.03	0.00**	0.04	0.00**	0.13	0.00**
Sector (9)												
R^2	0.26		0.24		0.65		0.67		0.68		0.73	
No. obs.	875		1310		3444		3916		4320		1642	

**, * significant at the 1% and 5% respectively

Source: Author's calculation.

The models are shown graphically in Fig. 2. The minimum values of the curves, as well as the average sizes and the 95% percentiles, indicate that the relevant area of analysis is to the left of the curves. This is where the growth rate is inversely related to the size. Over time, new entrants raise the average size of their units. Audretsch and Mahmood (1995) argue that this growth in size occurs for two reasons: i) the exit from the market of firms belonging to the cohorts, generally small companies; and ii) the growth of the firms remaining in the market.

In addition to the study of the behavior of the new entrants, we undertake a descriptive analysis of the firms' productivity and how this relates with the growth of the economy. The year firms decide to enter in a market is probably associated with a better economic situation in Spain. If this is so, firms entering the market in times of economic expansion benefit, enjoying higher growth rates than firms that enter the market when the economic situation is not so favorable.

As Segarra *et al*. (2002) points out for the manufacturing sector, the net entry rate of firms may be related to the economic cycle, with a positive correlation between firm

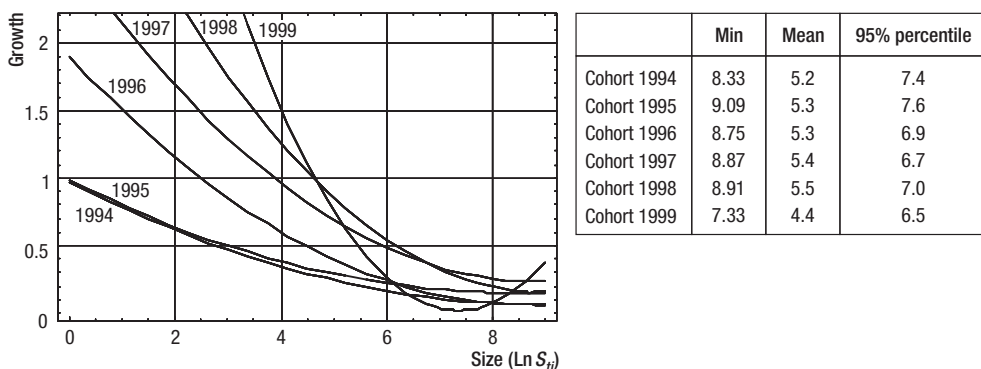|	Min	Mean	95% percentile
Cohort 1994	8.33	5.2	7.4
Cohort 1995	9.09	5.3	7.6
Cohort 1996	8.75	5.3	6.9
Cohort 1997	8.87	5.4	6.7
Cohort 1998	8.91	5.5	7.0
Cohort 1999	7.33	4.4	6.5

Fig. 2. Relation between entry growth of cohorts and size

creation and expansionary cycles and a negative correlation during recessions. In turn, Boeri and Bellman (1995), in a study of the German manufacturing sector, find no evidence that the economic cycle influences the exit of firms, at the same time as a weak sensitivity of exits to growth in terms of the number of employees in established firms. In this sense, when we study growth in the different cohorts of post-entry behavior the fastest growth is observed in new entrants from 1996 onwards – the point when the Spanish economy begins to enter an expansionary cycle. On the other hand, in Fig. 3 we can see the evolution in productivity (in terms of sales/number of employees) of the new entrants by cohorts. Although in general all the new entrants in their respective cohorts show gains in productivity, it is the cohorts of the years 1996–1999 that follow the growth in the economy pro-cyclically, above all compared to the cohorts of 1994 and 1995.

Disaggregating by sector, Fig. 4 presents the evolutions in productivity of the new entrants of each cohort in the different sectors of activity. There are generally improvements in productivity in all the sectors for all the cohorts. In particular, we can see some characteristic features. The productivity of the new entrants is higher in the first year in Sector 5 (sales, commerce, etc.) for all the cohorts, followed, by sectors 1 (food, drinks, etc.) and 6 (transport, post, etc.). In Sector 5 there are significant gains in average growth for all the cohorts, and the same is true for sectors 3 (office machines, electrical material, etc.) and 4 (construction, energy, etc.), while in sectors 1, 7, 8 and 9 this evolution in growth is most marked from the year 1996 onwards. Sectors 2 (wood and cork industry, chemicals, etc.) and 6 present the profiles of least evolution in productivity.

There are two empirical facts that tend to disconcert economists when they analyze processes of market entry and corporate turnover. The first concerns the asymmetric distribution of firms in terms of size, given that there is a clear predominance of smaller-sized firms. This could be suggesting *a priori* that a large number of firms are producing below a minimum efficient level (Sutton 1997). The second fact is that the entry of firms is high even in those sectors where the economies of scale are important, which might suggest that in these sectors this phenomenon does not discourage the entry of new firms.
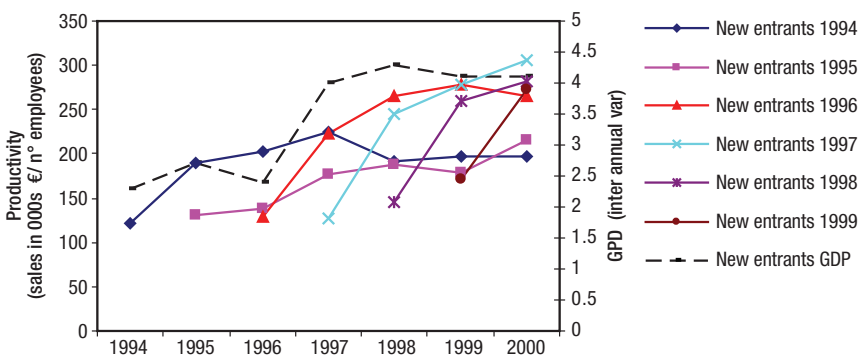

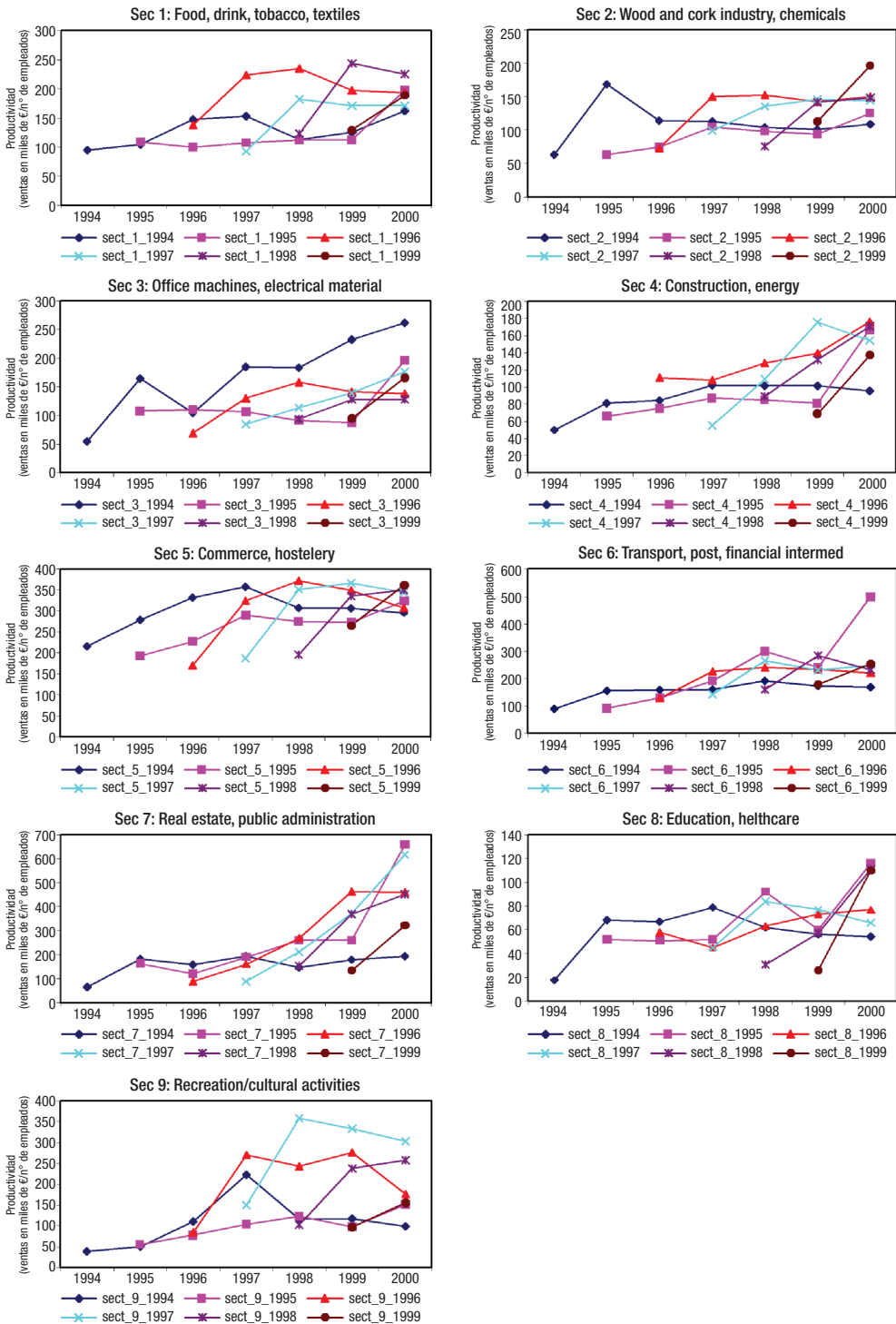**Fig. 3.** Evolution of average productivity by cohorts

Fig. 4. Evolution of mean productivity of new entrants by sector and cohorts

4.2. Entrants' size compared to established firms' size, by sector of activity

The statistical data analyzed in the previous section do not provide information about the diversity of firms entering the market in relation to the size of the firms already established in the sector. In Table 3 we report descriptive statistics about the new entrants by 1-digit sector, as well as the relative size of the new entrants as a proportion of the size of the established firms, under a longitudinal perspective (1994 to 1999).

Table 3. Size of new entrants each year as a proportion of size of established firms

	1994	1995	1996	1997	1998	1999	nº firm new entrants	nº firm estab.	Sectors groups 1 digit
sect_1_94	0.2	6.3	23.3	37.8	36.8	38.4	243	1137.0	Mineral extraction, food and drink, tobacco, textiles, leather goods and shoes
sect_1_95		4.1	21.7	26.7	30.8	33.6	345		
sect_1_96			60.5	99.7	108.3	94.3	560		
sect_1_97				16.2	29.6	40.0	568		
sect_1_98					68.5	124.3	490		
sect_1_99						39.4	48		
sect_2_94	6.2	28.9	25.1	23.6	24.4	23.7	366	1791	Wood and cork industries, paper, chemical ndustry, metallurgy, machinery
sect_2_95		7.5	15.5	14.9	15.0	16.3	567		
sect_2_96			8.6	20.1	22.6	21.3	1185		
sect_2_97				9.6	24.8	26.0	1130		
sect_2_98					6.7	15.3	1034		
sect_2_99						9.3	83		
sect_3_94	5.1	40.5	44.6	44.6	37.7	34.2	98	521	Manufacture of office machines, electrical machinery and material, optical, computing equipment, motor vehicles, furniture
sect_3_95		21.5	11.2	9.0	10.2	12.2	141		
sect_3_96			21.3	26.8	27.4	28.2	309		
sect_3_97				24.9	42.0	35.9	289		
sect_3_98					26.1	36.7	280		
sect_3_99						12.3	116		
sect_4_94	4.0	11.1	12.7	11.6	12.0	14.3	624	1669	Construction
sect_4_95		6.5	9.3	9.3	10.1	11.2	861		
sect_4_96			8.3	12.8	17.3	20.1	1673		
sect_4_97				19.4	36.1	36.9	1676		
sect_4_98					8.3	63.2	1601		
sect_4_99						27.1	777		

	1994	1995	1996	1997	1998	1999	nº firm new entrants	nº firm estab.	Sectors groups 1 digit
sect_5_94	13.7	29.3	32.9	33.6	30.9	35.7	1176	5895	Sale, maintenance and reparation of vehicles wholesale/retail commerce, hostelery
sect_5_95		16.5	21.4	28.2	26.4	31.6	1322		
sect_5_96			14.6	29.6	30.3	36.9	4106		
sect_5_97				14.7	26.5	34.3	4088		
sect_5_98					14.8	30.1	3475		
sect_5_99						15.5	157		
sect_6_94	8.0	27.9	38.7	34.9	35.6	31.9	127	847	Transport, post and telegraph, financial intermediation, insurance and pension plnas
sect_6_95		11.8	21.1	23.0	22.2	20.0	135		
sect_6_96			15.4	29.3	30.0	30.5	576		
sect_6_97				17.5	39.8	40.8	582		
sect_6_98					11.9	30.0	560		
sect_6_99						15.3	181		
sect_7_94	1.9	29.4	55.6	52.2	49.2	45.4	475	2012	Real estate, research and development, public administration
sect_7_95		8.3	17.5	17.4	17.4	17.8	598		
sect_7_96			9.0	19.0	23.1	25.7	1695		
sect_7_97				19.6	23.6	29.6	1920		
sect_7_98					15.3	21.5	1785		
sect_7_99						33.5	636		
sect_8_94	2.7	28.7	45.1	49.2	51.3	48.1	42	251	Education and healthcare activities
sect_8_95		13.0	62.6	69.3	46.5	39.3	29		
sect_8_96			20.0	35.1	46.9	55.3	139		
sect_8_97				24.6	48.4	65.6	140		
sect_8_98					12.8	47.5	114		
sect_8_99						48.0	49		
sect_9_94	3.7	5.1	20.6	28.4	19.2	21.6	56	241	Repair of public installations, recreational cultural and sporting activities
sect_9_95		4.7	22.7	19.2	13.8	14.0	78		
sect_9_96			9.8	34.8	20.1	17.0	187		
sect_9_97				35.4	38.0	45.9	218		
sect_9_98					25.0	27.4	173		
sect_9_99						14.5	160		

Source: Author's calculation.

Some of the questions that we pose in this section are: are the new entrants smaller and does this persist over time, or when they enter the market do they already have a substantial average size at the sector level? If they do remain small, does this occur in all sectors or does it differ in function of the structural characteristics of the sector, or the way the firms compete? If in contrast they enter the market with a particular size, which then modifies, how long does this adjustment process take, and is it similar in all the sectors?

In the introduction of this work we discussed the criteria referring to the new entrants' expectations about the profits they are likely to obtain and the obstacles or barriers to entry that they are likely to find. Providing answers to these questions in this section relates with aspects that the literature has in some cases already tackled: the new entrants' capacity of adjustment of their cost structures to the characteristics of the markets. The heterogeneity of the firms, their learning processes from their entry onwards, which uncover asymmetries in their efficiency levels, and the differences between organizations in their development of the skills of imitation and learning or the incorporation of more efficient capital goods, are some of the arguments that will prove useful in the analysis.

The findings reported in Table 3 allow us to point out some stylized facts: (a) As in Dunne, Roberts, Samuelson (1988), the average relative size of the new entrants as a proportion of the established firms grows in all sectors and all cohorts. For example, the size of the new entrants in Sector 5 (mid table) is 13.7% that of the established firms in the 1994 year of entry. In 1995 this proportion rises to 29.3% and it continues to grow until it reaches 35.7%, (b) The pattern of evolution in the growth of the new entrants varies in function of the sector of activity. While the level of relative size reaches 36.87% in Sector 5, in other sectors such as Sector 1 it reaches 124.3% for the 1998 cohort. (c) In general, new entrants' processes of adjusting their size with respect to the established firms take longer than six years. Consequently, in 1999 with very few exceptions the relative size of the firms in proportion to the established firms does not exceed 50%. Geroski (1995) indicates that new entrants are small and that they take over a decade to achieve sizes comparable to the established firms. (d) The entry size varies in function of the sector of activity. For example, in sectors 2, 4, 7 and 9, observing the entrants of each cohort and comparing them with the sectors 1, 3 and 8. On the other hand, if survival is related to size this latter may not be acquired immediately. Some authors Audretsch (1991); Mata and Portugal, (1994); Wagner (1994); among others provide evidence of the greater variability in survival rates among different sectors than among new entrants in the same sector.

4.3. Growth of established firms: size and age

The theories on the relation between age and growth in firms are closely related with those that link size and growth, due to the demonstrated relation between age and size. However, the available evidence does not categorically confirm that new firms – which are generally smaller than established firms – grow more rapidly. The theories of corporate growth are basically of two types. On the one hand, the stochastic theories are based on the marked asymmetry of distribution of firm sizes that is observed, with less

importance been lent to technological or demand aspects, considering that the evolution of firm size is influenced by a large number of explanatory factors that should be treated as random variables.

The determinist theory, on the other hand, is based on the neo-classical model and holds that growth is closely linked to the idea of optimal size. According to this approach, firms have the objective of carrying out a process of adjustment to achieve this more or less rapidly. The main result from the analysis is that firms wish to reach their optimal sizes as quickly as possible, but that there are costs of adjustment that prevent them from achieving this immediately. This implies that in sectors in which the firms have curves of average long-term costs that are U-shaped or similar there will be an inverse relation between size and growth, since large firms tend to have less need to grow in size than small ones, as the costs derived from having an inefficient size decline the closer the firm is to its optimal size.

Under this perspective of the corporate growth process – which is the perspective of this section, as we shall see later – the diversity of sizes observed in the market is simply a temporary situation caused by the fact that the firms are all at different stages of the process of adjustment towards their optimal size.

Fig. 5 suggests that the variability in growth of the sample firms observed between 1996 and 2001 is related to size and age. Smaller and younger firms tend to exhibit greater variability in their growth, considering the rate of cumulative growth (vertical axis). As the firms age (age groups at the top) and grow in size (Lnsales96), the variability in their growth declines. Thus, we see that in the early stages of life smaller firms tend to grow faster, which is in line with neo-classical growth models.

This finding – that large firms grow more slowly than small firms – is consistent with work carried out by Kumar (1985), Evans (1987), Acs and Audrestsch (1990), Dunne and Hughes (1994).

As we mentioned earlier, new entrants are generally smaller than established firms and consequently try to grow as quickly as possible in order to compensate for their size disadvantages. However, the existence of obstacles to investment, which are particularly intense in this type of firm (perhaps financial investment being the most worrying),
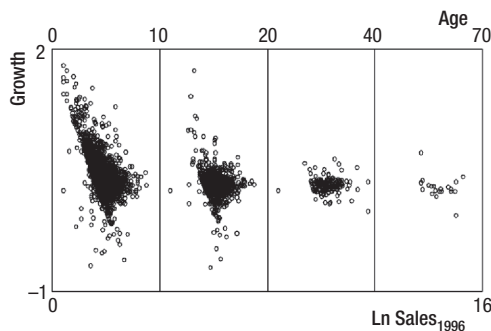

Fig. 5. Relationship between growth, size and age groups

means that many of them cannot achieve this. The existence of greater asymmetries in their access to investment among small firms than among large ones appears to be the cause of the greater variability in growth.

Table 4 reports the same results in a descriptive analysis. As firms pass from one age range to the next, their rate of growth declines while their average size increases.

Table 4. Panel analysis of firms from SABI database 1996–2001

	age <4		age >4 & <10		age >10 & <20		age >20	
	Grw.	Lnsales96	Grw.	Lnsales96	Grw.	Lnsales96	Grw.	Lnsales96
Mean	0.25	5.97	0.16	6.48	0.09	7.12	0.06	7.64
Std. dev.	0.25	1.46	0.20	1.34	0.14	1.20	0.12	1.39
Minimum	–0.91	0	–1.11	0	–0.89	0	–1.42	1.60
Maximum	2.07	11.59	2.07	14.3	2.08	13.7	1.21	15.5

Source: Author's calculation.

Our analysis demonstrates an inverse causal relation between growth and age, coinciding with Hart (1962), Mansfield (1962), Hall (1986), Evans (1987), Dunne and Hughes (1994). This relation is important because some theories of corporate growth predict particular patterns of growth in function of the life cycle of the firm.

4.4. Growth of established firms, age, size and sectorial characteristics

Nelson and Winter (1982) study the circumstances under which firms experience initial growth in relation to their size and the subsequent decline in growth. Later and Evans (1987) develops a growth model to determine the relations between these variables in the manufacturing sector. We shall apply this model to the database of established firms between 1994 and 2001. The model is as follows:

$$\text{Sales}_t^* = [G(\text{Age}_t, \text{Sales}_t)]^d (\text{Sales}_t)\, \varepsilon_t, \tag{3}$$

where: t represents the period considered, $t' > t$, $d = t' - t$ and e is the error term with lognormal distribution and with possibility of non-constant variance.
Equation (3) suggests the following regression to estimate growth:

$$(\text{LnSales}_t^* - \text{LnSales}_t)\, / \, d = +\text{Ln}\, G(\text{Age}_t, \text{Sales}_t) + \varepsilon_t, \tag{4}$$

where: μ_t is a normal distribution with mean zero and possibility of non-constant variance and independent of age and sales. According to Evans (1987), taking the second-order expansion of Ln G (Age, Sales) we obtain:

$$\text{Ln}\, G = \beta_0 + \beta_1 \ln \text{Sale}_{it} + \beta_2 \text{Ln Sale}_{it}^2 + \beta_3 \text{Ln age}_{it} + \beta_4 \text{Ln age}_{it}{}^2 + \beta_5 \text{Ln Lnage} * \text{Ln Sale} + \varepsilon_{it}. \tag{5}$$

The sample of firms that has been used for the analysis has considered the age of firms over three years. The literature on firm creation and survival holds that if companies

survive beyond their first three years of life – the peak period of organizational mortality – their chances of survival improve considerably.

Table 5 shows the results obtained. The behavior of the variables explaining growth – i.e., age and size – presents a quadratic form as in Evans's (1987) model (in this case with sales rather than employment to capture the size effect). The signs of the coefficients and their statistical representativeness show that the relation between growth and size is U-shaped, independently of the age range considered, while when we consider the age of the firms in their respective ranges some differences are observed.

Table 5 Analysis of growth of established firms 1996 – 2001

Lnsales01-Lnsales965	age >4 & <10	age >10 & <20	age >20 (and 15)
Variables	Coef. (St. Error)	Coef. (St. Error)	Coef. (St. Error)
Lnsales96	−0.334 (0.010)**	−0.347 (0.013)**	−0.153 (0.010)**
$(Lnsales96)^2$	+0.016 (0.0006)**	+0.018 (0.0006)**	+0.009 (0.0007)**
Lnage	−0.791 (0.240)**	+0.867 (0.402)**	−0.584 (0.1769)**
$(Lnage)^2$	+0.125 (0.068)**	−0.211 (0.081)**	+0.107 (0.031)**
Lnage*Lnsales96	+0.003 (0.0012)**	+0.002 (0.0006)**	−0.0006 (0.0001)**
Sector dummies (9)[†]			
Adjusted R^2	0.54	0.30	0.13
No. observations	3069	3588	2667

**, * Significant at different at 1% and 5% respectively
[†] There are statistically significant differences between the 10 sectors of activity F (9.7691) = 7.76

Source: Author's calculation.

The relation is U-shaped for the youngest and oldest firms, being inverted U-shaped for the firms of intermediate age (10–20 years). This behavior may be related to the life cycle of the firm according to a logistic trajectory. In the stages of birth and development firms grow when they are young, evolving in size and age. In the maturity stage the firms continue to grow in size and the age of the firms presents a convex form, until they reach the stage of full maturity, when the evolution in the size and age is similar to the initial stage, although the variation in growth is at approximately 58% of that in the earlier stages (1.21 compared to 2.08).

The positive coefficient of the variable *age*sales* indicates that the effect of the initial sales on growth is stronger the older the firm, and also that the effect of the age on growth is greater the higher the initial sales. This might suggest that the initial size of the firm, or its speed of adjustment, play an important role in its growth. Firms' greatest risk of failure and hence of abandoning the sector is associated with the smallest sizes. This implies that firms deciding to initiate their activity with sizes that are smaller than the efficient level and that then attempt to achieve the optimal size by means of the necessary process of adjustment may be at a significant initial competitive disadvantage. In the case of the oldest range of firms this effect is inverted.

4.5. The inter-sectorial mobility of firms

In previous sections we analyzed the relations between firm size, growth and age, depending on the sector of activity. We investigated whether large firms grow more slowly than small or medium-sized firms, or whether conversely they grow more quickly. In this section we shall study the differentiating characteristics of the established firms, by sector of activity, to subsequently determine the inter-sectorial mobility of firms.

We define firms to be above the average of their sector when they are larger than those that are below the average, when we use both sales and employment level as measure of firm size. Firms that are above the average are also older – by more than 13 years – being 20 years old on average.

On the other hand, with the data analyzed, firms with higher than average values are more productive (sales/number of employees) and profitable. But their financial profitability is not so favorable, perhaps as a consequence of the higher debt levels, greater fixed assets and higher relative labor costs of medium-sized and large firms.

The percentage of firms above the average is consequently small. Considering the averages of the year 1996, some 12%, of the firms are above the average, the minimum value is found in sectors 4 and 7 (construction and financial intermediation), with only 6.2% of the firms above the average, and the maximum in Sector 8, with 27.6%. But it is true that in this latter case the size of the sample is small (94 firms), hence the average will be sensitive to this.

In some sectors we find differences between the averages of the initial (1996) and final (2001) years considered, particularly in the variable sales. We recall that unfortunately we have not been able to capture processes of mergers and spin-offs that may have occurred at the sector level.

We carry out the same descriptive analysis with the median as the frontier or limit, to determine which firms exceed or have possibilities of exceeding the median. The conclusions drawn from the analysis of the mean are also valid when the frontier is the median. The differences between firms exceeding the median and those below it are that the former are larger in terms of sales, employment, productivity and economic profitability. Although in this case of course the median divides the group of firms in two.

In a first approximation Table 6 presents the transitions that have taken place between quartiles from 1996 to 2001. The values on the table diagonal indicate the firms remaining in their quartiles. For example, 12.04% of the firms (968) in the first quartile in 1996 remain in this quartile in 2001. Similarly at the other extreme of the diagonal 22.3% of the firms that were in the fourth quartile in 1996 remained in that quartile four years later. Transitions below the diagonal indicate downward movements from quartiles (demotions), while above the diagonal they represent promotions to higher quartiles.

There are fewer demotions than promotions, with the norm being promotions of levels. For example, a total of 8.18%, 3.36% and 1.50% of the firms belonging to the first quartile of 1996 promote to the second, third and fourth quartiles, respectively.

Table 6. Transition of firms from 1996 to 2001

		2001 1	2	3	4	Fila Total
1	|	968 |	658 |	270 |	121 |	2017
	|	12,04% |	8,18% |	3,36% |	1,50% |	25,08%
2	|	349 |	826 |	719 |	110 |	2004
	|	4,34% |	10,27% |	8,94% |	1,37% |	24,92%
3	|	64 |	219 |	1014 |	714 |	2011
	|	0,80% |	2,72% |	12,61% |	8,88% |	25,01%
4	|	27 |	23 |	159 |	1801 |	2010
	|	0,34% |	0,29% |	1,98% |	22,39% |	24,99%
Columna Total		1408	1726	2162	2746	8042
		17,51%	21,46%	26,88%	34,15%	100,00%

(1996 on the left vertical axis)

Source: Author's calculation.

Of the firms belonging to the third quartile in 1996, a total of 2.72% were demoted to the second quartile of 2001, and 8.88% promoted to the fourth quartile of that year. In Table 7 we show the transitions disaggregated for some sectors of activity.

Sectors 2 and 3 on the left of Table 7 show similar transitions (their behavior is similar to that of the sectors that have been omitted: 1, 7 and 9). Sectors 4 and 5 on the right of the table show more dynamism (this behavior is similar to the omitted sectors 6 and 8). In particular, Sector 5 exhibits a relatively lower permanence of its firms in their quartiles (diagonal), which varies with respect to the rest by some 2% approximately and a greater number of transitions upwards than the rest of the sectors, particularly promotions to the highest quartile. On the other hand, the dynamism of this sector is also observed when we examine the demotions.

Having analyzed the transition of firms in the period of time under analysis and their dynamism, considering the sector of activity, we might ask what is the probability that a firm exceeds the frontier in terms of the quartiles of the sector of activity where it operates? And, to what extent does growth affect its mobility over time? Finding a response to the first question could provide some evidence about the causes of firm survival. The answer to the second meanwhile may be more related to the question of whether growth really explains survival, and if so, how it is related with the rate at which the firm achieves an efficient size to be competitive, or its possibility of catching up if it does not have adequate growth.

This approach to determine the probability that the firm exceeds the frontiers (in terms of sales) or not and the temporal effect can be seen in Fig. 6.

In order to analyze the probability that a firm will promote from its quartile both in year t_o (1996) of the sample and 2001 – movements 1 and 1* of Fig. 6 – as well as to analyze the probability of improving its quartile to a higher quartile five years later (position 2), we use probit models. In the first case, we use an ordered probit, while in the second, where the transitions are linked to promotion or growth; we use a binary selection model. The starting equation is as follows:

$$y^* = \beta' x + \varepsilon. \tag{6}$$

Table 7. Transition of firms from 1996 to 2001 by sector

Sector 2

```
                          2001                                  Fila
            1           2           3           4              Total
        -----------------------------------------------------
  1     |    153 |       83 |       25 |        4 |            265
        |  14,49% |    7,86% |    2,37% |    0,38% |         25,09%
        -----------------------------------------------------
  2     |     46 |      134 |       73 |       10 |            263
1996    |   4,36% |   12,69% |    6,91% |    0,95% |         24,91%
        -----------------------------------------------------
  3     |      6 |       30 |      175 |       53 |            264
        |   0,57% |    2,84% |   16,57% |    5,02% |         25,00%
        -----------------------------------------------------
  4     |      0 |        1 |       22 |      241 |            264
        |   0,00% |    0,09% |    2,08% |   22,82% |         25,00%
        -----------------------------------------------------
Columna      205         248         295         308           1056
Total     19,41%      23,48%      27,94%      29,17%        100,00%
```

Sector 3

```
                          2001                                  Fila
            1           2           3           4              Total
        -----------------------------------------------------
  1     |     35 |       24 |       10 |        1 |             70
        |  12,37% |    8,48% |    3,53% |    0,35% |         24,73%
        -----------------------------------------------------
  2     |     13 |       32 |       24 |        2 |             71
1996    |   4,59% |   11,31% |    8,48% |    0,71% |         25,09%
        -----------------------------------------------------
  3     |      4 |        6 |       44 |       17 |             71
        |   1,41% |    2,12% |   15,55% |    6,01% |         25,09%
        -----------------------------------------------------
  4     |      1 |        1 |        4 |       65 |             71
        |   0,35% |    0,35% |    1,41% |   22,97% |         25,09%
        -----------------------------------------------------
Columna       53          63          82          85            283
Total     18,73%      22,26%      28,98%      30,04%        100,00%
```

Sector 4

```
                          2001                                  Fila
            1           2           3           4              Total
        -----------------------------------------------------
  1     |    104 |       67 |       40 |       15 |            226
        |  11,65% |    7,50% |    4,48% |    1,68% |         25,31%
        -----------------------------------------------------
  2     |     55 |       99 |       62 |        6 |            222
1996    |   6,16% |   11,09% |    6,94% |    0,67% |         24,86%
        -----------------------------------------------------
  3     |     16 |       41 |      106 |       60 |            223
        |   1,79% |    4,59% |   11,87% |    6,72% |         24,97%
        -----------------------------------------------------
  4     |      6 |        5 |       33 |      178 |            222
        |   0,67% |    0,56% |    3,70% |   19,93% |         24,86%
        -----------------------------------------------------
Columna      181         212         241         259            893
Total     20,27%      23,74%      26,99%      29,00%        100,00%
```

Sector 5

```
                          2001                                  Fila
            1           2           3           4              Total
        -----------------------------------------------------
  1     |    369 |      298 |      112 |       60 |            839
        |  10,99% |    8,87% |    3,34% |    1,79% |         24,99%
        -----------------------------------------------------
  2     |     83 |      288 |      408 |       61 |            840
1996    |   2,47% |    8,58% |   12,15% |    1,82% |         25,01%
        -----------------------------------------------------
  3     |     13 |       32 |      358 |      437 |            840
        |   0,39% |    0,95% |   10,66% |   13,01% |         25,01%
        -----------------------------------------------------
  4     |      7 |        7 |       26 |      799 |            839
        |   0,21% |    0,21% |    0,77% |   23,79% |         24,99%
        -----------------------------------------------------
Columna      472         625         904        1357           3358
Total     14,06%      18,61%      26,92%      40,41%        100,00%
```

Source: Author's calculation.

$$Prob\ [y_{1..4}] = \beta_0 + \beta_1 Ln\,age + \beta_2 Ln\,age^2 + \sum_{i=1}^{17}\beta_3\,Communitie + \sum_{i=1}^{10}\beta_4 sector + \varepsilon, \quad (7)$$

where: *Prob* is a variable taking four values in function of the quartile in which the firm finds itself; *age* refers to the age of the firm and age (square) the quadratic component of the age; *communities* is a dummy variable taking 18 values, according to the firm's autonomous community (i.e., region) of origin; Sector is a dummy variable taking 10 values in function of the firm's sector, according to NACE. The results are presented in Table 8.

The results considering the marginal effects are shown in Table 9.
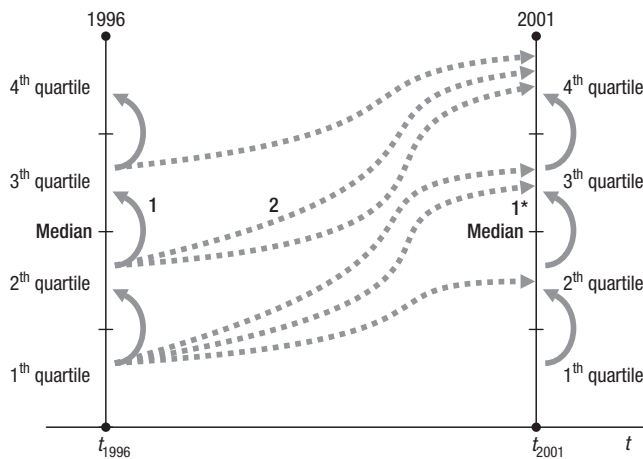
Fig. 6. Mobility and growth of firms in relation to time

Table 8. Ordered probit: Movements 1 and 1*

	Probability in 1996		Probability in 2001	
	Est. Coef.	Std. error	Est. Coef.	Std. error
Lnage	0.159	0.045**	−0.190	0.054**
Lnage^2	0.081	0.012**	0.134	0.012**
Comunidad (17)				
Sector (9)				
Quartile_1	−.557	.313	−1.14	.254
Quartile_2	.196	.313	−.456	.254
Quartile_3	.948	.313	.262	.254
No. obs.	7714		12121	
LR chi2	1137.59		1158.62	
Prob > chi2	0.0000		0.0000	
Pseudo R^2	0.0532		0.0346	

Source: Author's calculation.

Table 9. Marginal effects: Movements 1 and 1*

	Probability in 1996				Probability in 2001			
	dy/dx Quar- tile = 1	*dy/dx* Quar- tile = 2	*dy/dx* Quar- tile = 3	*dy/dx* Quar- tile = 4	*dy/dx* Quar- tile = 1	*dy/dx* Quar- tile = 2	*dy/dx* Quar- tile = 3	*dy/dx* Quar- tile = 4
Lnage	–0.046**	–0.016**	0.014**	0.049**	0.054**	0.020**	–0.011**	–0.063**
Lnage^2	(0.013)	(0.00)	(0.013)	(0.014)	(0.015)	(0.006)	(0.003)	(0.018)
Communities (17)	–0.02**	–0.00**	0.00**	0.025**	–0.03**	–0.01**	0.025**	0.045**
Sector (9)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Source: Author's calculation.

In 1996 the probability of transitions between lower levels declines with age, while it increases in the superior levels. For example, when the age varies by 10% the probability of moving in the low levels declines by 0.46% and 0.16% in quartiles 1 and 2 and increases by 0.14% and 0.49% in quartiles 3 and 4. This effect is reversed when we consider the year 2001, when the probability of moving in the lower quartiles increases and in the higher quartiles declines. These facts may be related with the growth in the Spanish economy. In 1996 the expectations were favorable and an expansionary cycle was beginning, hence the post-entry growth of the firms in their sectors benefited from this situation. The larger the initial size of the firms, the greater the effect of the age, and the higher the initial sales (as we have already said), the smaller the firms growing in the lower quartiles. In the higher quartiles it is the medium-sized and large firms that experience growth. On the other hand, in 2001 the effects could be the reverse, since the expectations of growth diminish, the probability of transitions is related to an initial minimum size, and the survival of small firms becomes difficult. Meanwhile, in the higher quartiles it is the smaller firms that can move, probably to the extent that they have greater flexibility and can adapt their size to market needs.

In Table 10 we report the results of the analysis of transitions of firms from their quartiles of 1996 to 2001 – Model 1. In Model 2 we consider the effect of the concentration of shares in the hands of the main shareholder. In this respect, we consider it relevant to examine the relation between the governance of the firm – measured by the control exercised by the majority shareholders – and growth. Models 3 and 4 capture the demotions produced during the same period.

Promotions from any quartile of 1996 to a higher one in 2001 are positively related with firm age. Moreover, the negative and statistically significant sign of the dummy variable measuring shares in the hands of the main shareholder indicate that the probability of promoting is related to firms with a non-concentrated ownership structure. Non-concentration of the ownership fosters higher growth than when the ownership is concentrated. Work such as Zahra (1996) and Zahra *et al.* (2000) analyses firms' entry into national and international markets in relation to the ownership structure. Some of these authors' findings show that the effects of ownership and governance can vary from one firm to another depending on their size. Marseguerra (1998) points to the importance of considering share concentration as a mechanism of management control.

Table 10. Promotion and demotion from quartiles of 1996 to 2001

	Promotion				Demotion			
	Transition (Promotion) 1996–2001 Model 1	Marginal effect (dy/dx)	Transition (Promotion) 1996–2001 Model 2	Marginal effect (dy/dx)	Transition (Demotion) 1996–2001 Model 3	Marginal effect (dy/dx)	Transition (Demotion) 1996 Zahra 2001 Model 4	Marginal effect $(dy/dx))$
Constant	−5.60**		−4.66**		4.08**		2.79**	
Lnage	(0.383)	0.90**	(0.507)	0.84**	(0.317)	−1.16**	(0.508)	−0.88**
Lnage^2	3.64**	(0.033)	3.38**	(0.053)	−2.97**	(0.040)	−2.50**	(0.056)
Acc. Share	(0.160)	−0.18**	(0.261)	−0.17**	(0.100)	0.17**	(0.152)	0.12**
(1 = >50%;	−0.74**	(0.007)	−0.71**	(0.011)	0.45**	(0.008)	0.35**	(0.012)
0 = <50%)	(0.033)		(0.054)	−0.02*	(0.021)		(0.033)	0.02
Communities (17)			−0.08*	(0.01)			0.07	(0.017)
Sectors (9)			(0.07)				(0.048)	
No. obs.	12256		3904		12256		3904	
LR chi2	1175.70		366.51		4039.44		1304.6	
Prob>chi2	0.0000		0.0000		0.0000		0.0000	
Pseudo R^2	0.0925		0.0909		0.2443		0.2652	
Log likelihood	−5766.7		−1832.6		−6247.6		−1807.4	

$$\text{Prob}\,[y_{1/0}] = \beta_0 + \beta_1 \text{Ln age} + \beta_2 \text{Ln age}^2 + \sum_{i=1}^{17} \beta_3 \text{Communitie} + \sum_{i=1}^{10} \beta_4 \text{sector} + \varepsilon$$

$$\text{Prob}\,[y_{1/0}] = \beta_0 + \beta_1 \text{Ln age} + \beta_2 \text{Ln age}^2 + \sum_{i=1}^{17} \beta_3 \text{Communitie} + \sum_{i=1}^{10} \beta_4 \text{sector} + \beta_4 \text{Share} + \varepsilon$$

Source: Author's calculation.

When there is a certain level of concentration of shares in the hands of one shareholder, this investor will have sufficient incentive to break with their rational apathy and control the operation of the firm. In this sense, two conditions should coincide (Pinillos 2001) to consider the concentrated ownership as a monitoring mechanism of the management: i) that there really is a high degree of concentration of the ownership of the firm, to allow for an active control function to be exercised; and ii) that the shareholders are guided by performance and the return on their investments.

The absence of shares in the hands of the managers can cause opportunistic behavior, with the managers supporting projects that increase their own personal wealth and favor and ensure their job security. When the objectives of the managers and shareholders are closely aligned embarking on new activities both creates value and pursues the managers' objectives. Berle and Means (1932) point out that a concentrated ownership of a firm has significant implications for the development of corporate strategy. Diversification can imply conflict of interests between managers and shareholders in situations where the diversification only means maximizing manager wealth.

It is important to consider that agency theory warns of a negative relation between ownership concentration and strategic diversification. In this respect, the shareholders' active control will favor the convergence of the managers' utility functions and the shareholders' interests. On the other hand, when control and ownership are separated, and the managers' interests are consequently directed at promotion, status, etc., expectations of company growth may improve.

With regards demotions, the probability of transitions to lower levels/quartiles diminishes with the age of the firm, and in this case the effect of a firm's ownership concentration is not significant. Firms that have not promoted from their quartile in the year considered (t_o), probably because of not having sufficient age – i.e., not having achieved sufficient growth rate – do not catch up and the probability of exceeding the frontier increases with age (comparing 1996 with 2001), although to a decreasing extent.

5. Conclusions

Although we have not been able to work with data as representative as those provided by DIRCE or other sources, we have enriched the analysis by incorporating firm variables at the individual level (sales, profitability, ownership structure, etc.). This has allowed us to understand important aspects about the running of the firms, which have in some cases directly or indirectly suggested important facts regarding the heterogeneity of the firms.

The growth of the new entrants in terms of turnover has similar patterns of convergence (convex form in the relation of growth and size). The effects of economic growth are reflected in the evolution of companies' size. While the entrants among the cohorts of 1994 and 1995 evolve similarly, in the cohorts from 1997 onwards the evolution is much more intense, with the growth increasing considerably year by year until 1999. This period corresponds to an expansionary phase in the economy. When we analyze the productivity – in terms of sales over number of employees – a similar effect is observed. This fact could suggest that although all new entrants into a market are affected by the growth in the Spanish economy (GDP), those belonging to cohorts from 1997–1999 benefit particularly from it.

When we analyze the growth of the new entrants in relation to the established firms, the following common characteristics are found: (1) Similarly to the findings of other authors (Dunne *et al.* 1988), new entrants' average relative size (in terms of sales) as a proportion of the established firms increases, in all the different industries and cohorts. For example, the new entrants in Sector 5 (commerce) have 13.7% of the size of the established firms. In 1995 this proportion rises to 29.3% and it continues to grow in the following years until it reaches 35.7%. (2) The pattern of evolution of new entrants' growth varies among the different sectors of activity. While the average size level reaches 36.87% in Sector 5, in other sectors such as Sector 1 (food, drink and tobacco), it reaches 124%. (3) In general the processes of size adjustment of the new entrants with respect to the established firms take over five years. Geroski (1995) indicates that new entrants are small in size and that these firms take more than a decade to achieve sizes

comparable to the established firms. (4) The entry size and hence the level of resources a firm has at its disposal to be in a position to compete, is a function of its sector of activity. For example, sectors 2, 4, 7 and 9, observing the new entrants of each cohort and comparing them with sectors 1, 3 and 8. On the other hand, if survival is related to size, this latter may not be acquired immediately. In some works, such as Audretsch (1991), Mata and Portugal (1994) and Wagner (1994), among others, some evidence is provided of a greater variability in survival rates between different sectors than among entrants of the same sector.

When we analyze the characteristics of the new entrants and established firms, the following characteristics are found: (1) From a panel of data from 1996 to 2001 we observe that the variance of firm growth observed is related to the size. The smallest firms have greater variability of growth than the larger ones. The result obtained in this work with regards the fact that large firms grow more slowly than small firms is consistent with other studies carried out by Kumar (1985), Evans (1987), Acs and Audrestsch (1990), Dunne and Hughes (1994). (2) On the other hand, we find that growth declines with age, as some authors have found (Hart 1962; Mansfield 1962; Hall 1986; Evans 1987; Dunne and Hughes 1994). This causal relation is important, because some theories of corporate growth predict particular patterns of growth depending on the stage in the life cycle of the firm. The current analysis confirms the inverse relation between growth and age. (3) The growth observed in the established firms – i.e., firms with more than three years of activity in the market – has a similar behavior to the life cycle of the firm and confirms the results obtained by Evans (1987). In particular this analysis has been carried out using three samples of different ages. For the first sample, where the group of ages ranges from 4 to 9 years, the growth relates to the evolution in sales and the age in a U shape. For the range of ages between 10 and 20 years the sales continue to have the same form, but the age changes the trajectory to an inverted U shape. Finally, for the firms older than 20 years, the behavior of age and size are the same as for the youngest group, although the variability of the growth declines (58% of that of the first group). (4) On the other hand, the effect of age on growth is stronger the higher the initial sales. This could suggest that the initial size of the firm, or its rate of adjustment, play an important role in growth. Firms' greatest risk of failure and hence of abandoning the sector is associated with smaller size. This implies that firms that decide to initiate their activity with sizes that are smaller than the efficient level, and that aim to achieve the optimal size by means of the necessary learning process, may start out with a substantial competitive disadvantage.

Finally, when we analyze firms' probability of transition in function of the quartile (in terms of sales volume) to which they belong in the years 1996 and 2001, we find that in 1996 the probability of promotion declines with age among the lower levels (first and second quartiles), while it increases among the higher levels (third and fourth quartiles). This effect is inverted when we consider the year 2001, when the probability of transition increases with age in the lower levels and decreases in the higher levels. These facts may be related with the growth in the Spanish economy. In 1996 the expectations were favorable and an expansionary cycle was beginning, and hence the post-entry growth

of firms in their sectors benefited from this situation. The larger the initial size of the firms, the stronger the age effect, and the higher the initial sales, the smaller the firms growing in the lower quartiles. In the higher quartiles it is the medium-sized and large firms that experience growth. On the other hand, in 2001 the effects may be inverted, since the expectations of growth diminish, the probability of transition is related with a minimum initial size, and the small firms find it difficult to survive. In the higher quartiles it is now the smaller firms that can move quartiles, probably to the extent to which they are more flexible and can adapt their size to market needs.

In the transition of firms from quartiles of 1996 to 2001 we have considered the promotion of firms to a higher quartile, their demotion to a lower one and the effect of the concentration of shares in the hands of the main shareholder. In this respect, we consider it relevant to examine the relation between the governance of the firm – measured by the majority shareholders' exercise of control – and growth. Promotions from any quartile in 1996 to a higher one in 2001 are positively related with firm age. Moreover, the probability of promotion is also associated with firms where the ownership structure is not concentrated.

To conclude this work, we propose some policy recommendations: First, an efficient corporate governance system may prove as a significant policy tool for the investment and growth prospective of the Spanish economy. Second, knowing that regulatory framework of the Spaniard capital market has been coordinate with the EU standards, the challenge is now mostly for the firms to adopt the appropriate corporate governance structures, in order to achieve real convergence, in terms of productivity and competitiveness, with other developed economies.

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APPENDIX 1

The characteristics of the databases used are as follows

Panel of firms from SABI database between 1996 and 1999: Established firms					
Variable	No. observ.	Mean	Std. dev.	Minimum	Maximum
Age (Years)	10142	13.6	8,61	4	99
Sales_1994 (000s €)	5066	8050	270	0.1	$1.04 \ 10^6$
Sales_1995	6380	7604	331	0.5	$1.12 \ 10^6$
Sales_1996	8044	7213	411	1	$1.72 \ 10^6$
Sales_1997	8889	7794	389	1.2	$1.92 \ 10^6$
Sales_1998	9617	8212	463	0.4	$2.19 \ 10^6$
Sales_1999	10034	8973	478	1	$2.52 \ 10^6$
Sales_2000	10100	10096	523	1	$3.62 \ 10^6$
Sales_2001	10672	10827	498	0.6	$3.12 \ 10^6$
No. empl_94 (No. employees)	2196	25	270	1	10235
No. empl_95	3693	28	285	1	11540
No. empl_96	5061	24	311	1	13272
No. empl_97	5507	26	350	1	14323
No. empl_98	6382	27	372	1	19065
No. empl_99	7162	30	391	1	22366
No. empl_00	7726	36	400	1	24762
No. empl_01	7829	37	411	1	25547
Productivity_94 (Sales/no. empl.)	2196	327	1795	0.2	19336
Productivity_95	3693	275	1549	0.6	21314
Productivity_96	5061	296	1540	0.9	22328
Productivity_97	5507	304	1227	1.2	122323
Productivity_98	6382	301	1378	1.7	150328
Productivity_99	7162	302	1078	1.8	195421
Productivity_00	7726	279	801	2.1	40621
Productivity_01	7829	289	923	2.0	65248

Source: Author's calculation.

APPENDIX 2

Panel of firms from SABI database between 1994 and 2000: new entrants
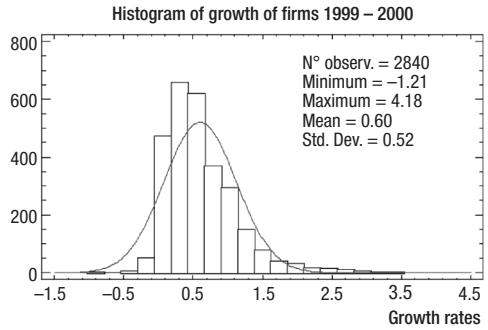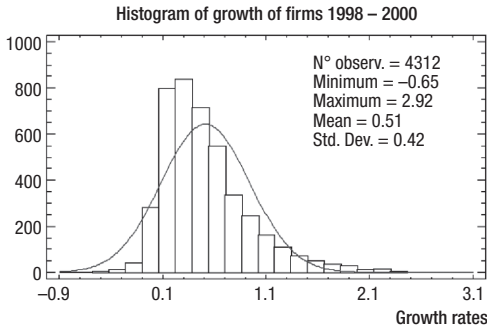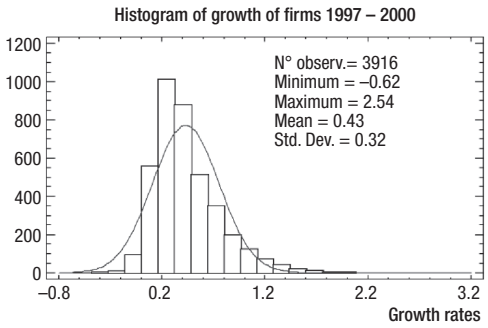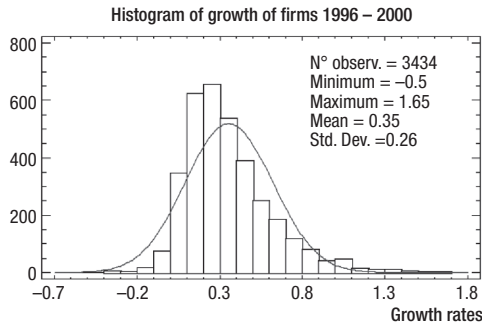
Variable	No. observ.	Mean	Std. dev.	Minimum	Maximum
Entrants in 1994					20603
Sales_1994 (000s €)	901	517	1501	0	135055
Sales_1995	1986	2941	44133	0	159113
Sales_1996	3121	2982	42927	0	236682
Sales_1997	3808	3306	50775	0	289687
Sales_1998	4619	3484	55929	0	331036
Sales_1999	5183	3802	61845	0	584343
Sales_2000	5697	4639	76442	0	228
No. empl_94 (no. employees)	439	6	13.7	1	6653
No. empl_95	1132	20	223.08	1	7456
No. empl_96	1868	29	304.07	1	12460
No. empl_97	2354	31	381.2	1	19056
No. empl_98	3066	33	487.09	1	22366
No. empl_99	3796	32	498.7	1	24767
No. empl_00	4501	32	492.6	1	3183
Productivity_94 (Sales/no. empl)	423	122	265	0	9931
Productivity_95	1098	189	547	0	13135
Productivity_96	1841	201	556	0	12498
Productivity_97	2323	225	655	0	16284
Productivity_98	3024	193	583	0	16982
Productivity_99	3751	198	646	0	20177
Productivity_00	4441	198	683	0	
Entrants in 1995					
Sales_1995 (000s €)	1361	688	2940	0	73582
Sales_1996	3036	883	3463	0	116903
Sales_1997	4071	1176	4350	0	132742
Sales_1998	5297	1317	5096	0	200879
Sales_1999	6092	1519	6848	0	272906
Sales_2000	6808	1982	2392	0	1848060
No. empl_95 (no. employees)	742	8	22.5	1	319
No. empl_96	1798	15	217.8	1	9158
No. empl_97	2425	15	188.6	1	9155
No. empl_98	3439	14	157.1	1	9036
No. empl_99	4456	14	142.8	1	8780
No. empl_00	5350	12	54.7	1	3286
Productivity_95 (Sales/no. empl.)	709	129.8	308.0	0	5274
Productivity_96	1742	139.2	353.8	0	8531
Productivity_97	2377	176.5	493.9	0	11390
Productivity_98	3387	187.6	602.6	0	13255
Productivity_99	4405	179.2	529.7	0	12116
Productivity_00	715	239.9	1303.6	0	16222

Variable	No. observ.	Mean	Std. dev.	Minimum	Maximum
Entrants in 1996					
Sales_1996 (000s €)	4172	787	5796	0	288577
Sales_1997	7241	1671	11015	0	661314
Sales_1998	9213	1993	10880	0	613012
Sales_1999	10454	2238	11358	0	655869
Sales_2000	8937	2349	13067	0	745028
No. empl_96 (No. employees)	2357	11	49.90	1	4046
No. empl_97	4335	14	60.16	1	2383
No. empl_98	6054	18	80.57	1	3164
No. empl_99	7480	18	72.06	1	3294
No. empl_00	6857	18	100.7	1	4552
Productivity_96 (Sales/no. emp.)	2357	128	486	0	20620
Productivity_97	4335	223	586	0	15034
Productivity_98	6054	266	796	0	26219
Productivity_99	7480	278	1065	0	73071
Productivity_00	6827	266	736	0	28040
Entrants in 1997					
Sales_1997	4650	977	10587	0	641090
Sales_1998	8765	2004	23261	0	1994720
Sales_1999	10520	2430	21223	0	1873050
Sales_2000	9257	2662	23324	0	1936630
No. empl_97	2685	16	12995	1	4164
No. empl_98	5555	25	58124	1	11272
No. empl_99	7318	26	87333	1	18027
No. empl_00	6830	26	67095	1	12789
Productivity_97	2685	128	334	0	8602
Productivity_98	5555	244	631	0	15189
Productivity_99	7318	279	823	0	33036
Productivity_00	6830	304	890	0	27732
Entrants in 1998					
Sales_1998	5157	1024	8473	0	403273
Sales_1999	9157	3602	103715	0	9643620
Sales_2000	8615	4574	110852	7	9592930
No. empl_98	3227	30	904	1	51093
No. empl_99	6317	31	700	1	51093
No. empl_00	6273	34	608	1	45441
Productivity_98	3227	146	535	0	20293
Productivity_99	6317	259	1259	0	84444
Productivity_00	6273	280	795	0	25646
Entrants in 1999					
Sales_1999	2807	1154	13059	0	538800
Sales_2000	3195	1590	10446	0	355691
No. empl_99	2077	28	187	1	6640
No. empl_00	2891	20	279	1	11480
Productivity_99	2802	875	6307	0	229590
Productivity_00	3220	1514	9879	0	352510

Source: Author's calculation.

APPENDIX 3

Distribution of growth of new entrants by cohort

Histogram of growth of firms 1994 – 2000

N° observ.= 1310
Minimum = −1.23
Maximum =1.56
Mean = 0.24
Std. Dev. = 0.26

Histogram of growth of firms 1994 – 2000

N° observ. = 1310
Minimum = −1.23
Maximum = 1.56
Mean = 0.24
Std. Dev. = 0.26

Histogram of growth of firms 1996 – 2000

N° observ. = 3434
Minimum = −0.5
Maximum = 1.65
Mean = 0.35
Std. Dev. =0.26

Histogram of growth of firms 1997 – 2000

N° observ.= 3916
Minimum = −0.62
Maximum = 2.54
Mean = 0.43
Std. Dev. = 0.32

Histogram of growth of firms 1998 – 2000

N° observ. 4312
Minimum = −0.65
Maximum = 2.92
Mean = 0.51
Std. Dev. = 0.42

Histogram of growth of firms 1999 – 2000

N° observ. = 2840
Minimum = −1.21
Maximum = 4.18
Mean = 0.60
Std. Dev. = 0.52

KOMPANIJOS DYDIS, AMŽIUS IR NUOSAVYBĖS STRUKTŪRA: EMPIRINIS TYRIMAS ISPANIJOS ĮMONĖSE

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Santrauka

Pateikiami empirinio tyrimo, atlikto Ispanijos kompanijose, rezultatai. Tirti buvo pasirinktos skirtingiems pramonės sektoriams (pagal ekonomikos veiklų klasifikatorių) priklausančios įmonės. Tyrimo metu nustatyta, kad egzistuoja sąryšis tarp įmonės dydžio ir amžiaus, kad įtakos turi ir skirtingi pramonės sektoriai, kuriuose veikia įmonė, nustatytas sąryšis tarp įmonės dydžio bei ekonominio aktyvumo, įmonės nuosavybės ir augimo. Atsižvelgiant į tai, siūloma veiksminga verslo valdymo sistema, kuri gali būti priimta kaip viena svarbiausių politikos priemonių pritraukiant investicijas ir didinant Ispanijos ekonomikos augimą. Pasiūlytosios veiksmingos verslo valdymo sistemos priemonės padės įmonėms didinti produktyvumą ir stiprinti konkurencinį pranašumą, palyginti su kitomis ekonomiškai stipriomis valstybėmis.

Reikšminiai žodžiai: įmonės dydis, įmonės amžius, ekonominis augimas, nuosavybės forma, Ispanijos įmonės.

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