Market Selection Along the Firm Life Cycle

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Abstract

This paper analyses market selection in French manufacturing goods markets over the last decade, under the hypothesis that the competitive challenges which firms have to face may change along its life cycle. We find that on average, exiting firms display below-average performance levels in terms of profitability and productivity. However, the institutions that help markets to rightly operate this selection process may be more severe for young firms. Young firms are challenged not because of their relative efficiency - they rapidly reveal themselves more efficient than old firms - but in terms of industry concentration and turbulence. This result reveals the presence of barriers to firm growth - not to entry - as an important driver of industry dynamics. Moreover, mature firms who fail to continuously renew their productive efficiency and economic profitability are forced to eventually exit the market. Thus, as far as mature firms are concerned, French markets select against persistent bad performers, not against temporary losses of efficiency.

1 Introduction

One of the most salient findings of the recent empirical literature on industrial economics is that the competition and selection of heterogeneous firms contributes positively to aggregate economic growth. Basically, it has been shown that exiting firms were usually concentrated in the lowest part of the productivity distribution, suggesting that markets were contributing to aggregate productivity in rightly selecting against inefficient firms. Evidence of this market selection mechanism has been found in a large variety of countries. A non-exhaustive list of contributions includes, among others, Baily et al. (1992), Haltiwanger (1997), Foster et al. (2001) for the United States, Griliches and Regev (1995) for Israel, Aw et al. (2001) for South

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Korea and Taiwan, and Nishimura et al. (2005) for Japan. Furthermore, Bartelsman et al. (2004) and Bartelsman et al. (2005) provide comparisons of the contribution of firm turnover to aggregate productivity growth for ten OECD countries.

These robust stylised facts must not conceal the fact that market selection mechanisms may work more or less efficiently across countries, industries and over time, depending on a potentially large host of factors. For instance, Scarpetta et al. (2002) argue that, on average, firms tend to exit with better relative productivity levels in downturn times and in mature and/or restructuring industries. Aw et al. (2001) compare data for Taiwan and South Korea from 1983 to 1993, a period of rapid economic expansion for both those economies. They conclude that institutions in Taiwan have, nonetheless, been more effective in supporting the market selection process against unproductive firms. Lastly, Nishimura et al. (2005) advocate that the selection mechanisms no longer works in severe recessions. The authors show that over the decade of the recessive Japanese economy, mature unproductive Japanese firms remained in the market while younger efficient ones exited.

By contrast, the slow but steadily growing French economy has been characterized by rightly operating market selection mechanisms. Over the 1990-2002 period, Bellone et al. (2006) show that French exiting firms were about 5% less productive than their surviving counterparts at the date of exit. It could be argued than the regulatory framework in France is less efficient than the one in the US to promote the growth of new firms during this period. The main conjecture is that the higher entry and labour-adjustment costs in France encourage more pre-entry evaluation of business plans with consequently less market experimentation and ostensibly slower firm expansion. Then, start-ups in France tend to be larger and, on average, more productive than those in the United States but their survival probability is lower and their growth rate slower. Bartelsman et al. (2005) provide stylized facts supporting this view. This caveat is particularly important because it suggests that market selection mechanisms may be less efficient in France than in the faster growing US economy to promote young firms.

Given that young firms, including entering firms, play a crucial role in promoting growth by infusing markets with more modern technologies compared with incumbents, a better understanding of the duration of both young and old firms and of their determinants is much at need in France. Empirical studies aim at identifying the determinants of the hazard rate of firm exit (Audretsch, 1991; Mata and Portugal, 1994). These are grasped through a host of industry characteristics such as industry structures (i.e. concentration, the minimum efficient scale,etc.) and industry turbulence (firm turnover, size of entrants and growth of overall sales, among others) and firm performance, notably size and profitability. The observed vector of parameter estimates associated with those variables is then interpreted as the results of competition between firms in imperfect markets. The significant of most industry characteristics is generally interpreted as reflecting the fact that market selection mechanisms do not operate equally over uniformed industries.

However, none of these studies provide any evidence as to whether these market selection mechanisms operate equally over the same set of firms within an industry. The purpose of this paper is to fill this gap by documenting how the determinants of firm duration - in terms of firm performance and industry characteristics - act differently according to the age of the firm[1]. To do so, we develop duration models to then emphasise the role of imperfect competition in shaping pre-exit selection processes. Basically, our research consists of investigating how the determinants of firm duration impact differently along the firm's life cycle. We use measures of firm performance - in terms of profitability and productivity - rather than size as a proxy of efficiency, and measures of industry characteristics to proxy for market structures and turbulence. To our knowledge, this research is the first to consider explicitly that the determinants of firm duration differ with firm age.

From the theoretical viewpoint, the starting point is the so-called industrial dynamics literature, relating the firm's decision to exit to its profitability. In the seminal papers of Jovanovic (1982) and Hopenhayn (1992), firms are endowed at birth with a time invariant profitability parameter, which determines the distribution of its future profit stream. A central feature of the model is that a new firm does not know what its relative efficiency is (its cost function), but rather discovers it through the process of Bayesian learning from its actual post-entry profit realizations. By continually updating such learning, the firm decides to expand, contract, or exit [2]. By contrast, in Ericson and Pakes (1995), it is assumed that the firm's profitability parameter may change overtime as a response to the stochastic outcomes of the firm's own investments, and those of other actors in the same oligopoly market. The firm grows if successful, shrinks or exits if unsuccessful [3]. These two basic models predict that firm turnover is negatively related to entry costs and, in turn, that low firm turnover is correlated with large productivity gaps between exiting and surviving firms. Moreover, these models are based on the very idea that aggregate economic growth is rooted in the heterogeneity of performance between competing firms.

In a different vein, the work of Gort and Klepper (1982) has initiated a series of theoretical and empirical investigation concerning the so-called industry life cycle. The theoretical models of Klepper (1996), Klepper (2002*b*) and repeated empirical investigation by Klepper and Simmons (2005); Klepper (2002*a*) and Argawal and Audretsch (1995) implies that the dynamics of product markets is likely to affect firm exit. The stylized fact predicts that in early stages of the industry, competition is mainly based on product innovation. Both firm entry and firm exit are frequent, although entry dominates over exit. At this stage, product competition is the rule, so that there is no decisive advantage in implementing large scale production. As the industry matures, process innovation dominates so that price competition plays a major role in dictating firm exit. At this stage, there is a natural advantage for large, generally older, firms in that they can spread the unit costs reduction into larger scales of production. It follows that beyond and above the chief role of firm profitability in predicting accurately firm exit, one should also consider market structures and industry turbulence as potential determinants of the fate of firms.

We examine firm survival and the determinants of market exit using a large scale micro-level dataset on French manufacturing firms over the 1990-2002 period. We have several findings. First, we find that the exit rate decreases first sharply to smoothly flatten. After 9 years of existence, the probability of exit fluctuates around 6%. This results is consistent with previous findings where firms under 5 years of age experience particularly high exit rates. Second, if entry and exit rates are positively correlated across industries, we find that industries differ greatly in the level of firm turnover. This suggests that accounting for industry characteristics may be important to explain the fate of manufacturing firms. Third, on average, firms experience continuous productivity gains throughout their life cycle. In the first three years of the firm's existence, the productivity growth is found to be higher than that of the industry average. This yields a growing productivity advantage until age 3, after which it decreases continuously to then vanish completely. Fourth, profitability is by far the chief reason explaining firm exit, since firms witnessing negative profits are twice as likely to exit the industry. Fifth, we observe that firm performance, either in terms of profitability or in terms of productivity, becomes gradually more critical for firm survival as the firm grows. Conversely, the selection effect of industry characteristics is much larger for young firms than for old firms. These findings suggest the existence of a two-tier market structure, where old and rather stable firms compete on profitability whereas young firms evolve in a more turbulent environment in which productive efficiency has little to say in selection. Rather, the micro-economic determinants of markets selection of young firms must be found elsewhere, such as size disadvantage or access to financial resources.

This paper is organised as followed. Section 2 first describes the dataset and the methodology used to estimate firm productive efficiency. It also provides descriptive statistics on turnover by industry and captures the post entry performance of young firms. Section 3 focuses on the market selection process along the life cycle of the firm by means of duration models. Section 4 concludes.

2 Firm Turnover and Productivity in French Manufacturing Industries

2.1 Data and Measurement

In order to characterise the relative performance of firms within French manufacturing, we use the firm data set collected by the French Ministry of Industry (SESSI). The French Census for Manufacturing (called EAE) is a unique census gathering information on the financial statements and balance sheets of all individual manufacturing firms with at least 20 employees, starting from 1990 to 2002. While this total of 23,000 firms represents 25% of all manufacturing firms in France, it accounts for 75% of employment and 80% of value added in French manufacturing.

In accordance with Bartelsman et al. (2005), we rely on the following standard definition of entrants, continuing and exiting firms. An entrant is a firm that exists in the reference year t, but not in $t-1$. An exiting firm is a firm that exists in year t but not in $t+1$. A continuing firm is a firm that exists in years t, $t+1$ and $t-1$. When applied to our dataset, these definitions induce some re-entry phenomena, essentially due to the +20 employee threshold effect[4], which induces an overestimation of firm turnover rates[5]. In what follows, we correct the turnover rate by discarding re-entering firms from the sample.

[Table 1 about here.]

Table 1 shows that firms entry and exit rates average about 9% and 10%, respectively. Firm turnover rate, defined as the sum of both the entry and the exit rates, averages 18% per annum, displaying a slightly decreasing trend over the period. These numbers are slightly lower than those reported by Bartelsman et al. (2005)

for France. They nonetheless make France a country with a relatively high turnover rate as compared with other OECD countries. Another feature of our dataset, which is in line with the existing literature, is that industries differ significantly according to their turnover rates. This is a potentially important phenomenon as it may have a strong say in the fate of firms in terms of their hazard rate of exit.

[Table 2 about here.]

Table 2 shows the average annual turnover rates for each of our 14 two-digit level industries. As expected, industries differ greatly in the level of firm turnover and entry and exit rates are positively correlated across industries. The highest turnovers have to be found in *clothing and footwear*, *printing and publishing*, and *electrical and electronic equipment*, while the lowest characterize *automobile*, *chemical industries*, *mineral industries*, and *metallurgy*. Those cross-industry differences in terms of turnover rates may reflect various phenomena. They may reveal differences in entry costs across industries (Hopenhayn, 1992), or differences in market sizes (Asplund and Nocke, 2003) or difference in the rate of technological progress Jovanovic and Tse (2006). To fully understand those causes is beyond the scope of this paper. We are more interested with the consequences of cross-industry variations in turnover rates. One important concern in this paper is to investigate how firm productive efficiency is related to the hazard rate of exit. To do this, we first need to measure firm productive efficiency.

We measure firm productive efficiency by means of two complementary indicators, namely Labour Productivity (LP) and Total Factor Productivity (TFP). *Labour Productivity* is defined as the log-ratio of real value added on labour (hours worked):

$$\ln LP_{it} = \ln\left(\frac{V_{it}}{L_{it}}\right) \tag{1}$$

where V_{it} denotes the value added of the firm deflated by sectoral price indexes published by INSEE (French System of National Accounts). Next, we compute *Total Factor Productivity* by using the so-called *Multilateral Productivity Index* first introduced by Caves et al. (1982) and extended by Good et al. (1997). This methodology consists in computing the TFP index for firm i at time t as follows:

$$\begin{aligned}\ln TFP_{it} = \ln\ Y_{it} - \overline{\ln\ Y_t} + \sum_{\tau=2}^{t}\left(\overline{\ln\ Y_\tau} - \overline{\ln\ Y_{\tau-1}}\right)\\ - \left[\begin{array}{l}\sum_{n=1}^{N}\frac{1}{2}\left(S_{nit}+\overline{S_{nt}}\right)\left(\ln\ X_{nit}-\overline{\ln\ X_{nt}}\right)\\ +\sum_{\tau=2}^{t}\sum_{n=1}^{N}\frac{1}{2}\left(\overline{S_{n\tau}}+\overline{S_{n\tau-1}}\right)\left(\overline{\ln\ X_{n\tau}}-\overline{\ln\ X_{n\tau-1}}\right)\end{array}\right]\end{aligned} \tag{2}$$

where Y_{it} denotes real gross output produced by the firm i at time t using the set of n inputs X_{nit}, where input X is alternatively capital stocks (K), labour in terms of hours worked (L) and intermediate inputs (M). S_{nit} is the cost share of input X_{nit} in the total cost (Appendix A provides a full description of the variables). Subscripts τ and n are indices for time and inputs, respectively. Symbols with upper bar correspond to measures for the reference point (the hypothetical firm), computed as the means of the corresponding firm level variables, over all firms in year t. Note that Eq.(2) implies that references points $\overline{\ln Y}$ and $\overline{\ln X}$ are the geometric means of the firm's output quantities and input quantities respectively, whereas the cost shares of inputs of the representative firms $\overline{S}$ is computed as the arithmetic mean of the cost share of all firms in the dataset.

This methodology is particularly well suited for comparisons within firm-level panel data sets across industries as it guarantees the transitivity of any comparison between two firm-year observations by expressing each firm's input and output as deviations from a single reference point. Applying such methodology to our dataset reveals strong variations in Industry productivity growth over the period of investigation. Average TFP growth rate ranges from around 3% per annum in the fastest growing industries to less than 0.3% per annum in the lowest growing industries. Those differences may also contribute to shape the relationship between firm Productive efficiency and the hazard rate of exit.

2.2 Characteristics of Entrants and Post-Entry Performance

The previous Subsection provides evidence of a considerable heterogeneity in firm's exit and turnover rates across industries. The main objective of this paper is to deepen this analysis by clarifying the determinants of exit along the firm life cycle. We begin by looking at Figure 1 that portrays firm's hazard rates[6] for the first 13 years of their lifespan. These results are quite consistent with the bulk of empirical studies dedicated to firms' demography[7]: entrants suffer from high rates of infant mortality but hazard rates decline steeply with age in the first years, and then stabilise to fairly constant values for firms more than one decade old. More precisely, entrants experience a first-year hazard rate of about 18%. This rate declines almost regularly over a decade to the 5 - 7 percent range.

[Figure 1 about here.]

Competitive pressure reveals itself to be very rigorous and results in a drastic selection process: only about 50% of firms succeed to survive beyond the seventh year (see Figure 2). These numbers are quite in line with the ones reported for France by Bartelsman et al. (2005).

[Figure 2 about here.]

Because productive efficiency is usually considered as a major determinant of firm survival, it could be of interest to examine TFP performance of entrants. In order to do this, we first compute the value of TFP of each firm i at period t *relative* to the average value of TFP of all firms that belong to the same industry.

$$ln\widetilde{TFP}_{it} = \ln TFP_{it} - \ln \overline{TFP}_t \quad (3)$$

where $\ln \overline{TFP}_t$ stands for the arithmetic mean of TFP of firms in industry I at period t[8]. Then, firms are ranked by their relative productivity in each year and placed into quintiles. The first two columns of Table 3 show the productivity distributions for two categories of entrants. The first ones will succeed to survive at least one more year (Column labeled *Stayers*), the second ones will not (Column labeled *Exitors*).

[Table 3 about here.]

A salient result emerging from Table 3 is that, for entrants, the two distributions look similar, suggesting that relative technical efficiency is not a crucial determinant of young firms' survival. By contrast, the last two columns of Table 3 show that things look substantially different for mature firms (13 years firms in this case): exitors are clearly concentrated in the lowest productivity quintile (Quintile 1), suggesting that for this category of firms, low productivity is closely associated with the hazard of exit. This is a first clue that militates in favour of the hypothesis that the determinants of firm survival change drastically with its age, leaving room for a potentially inefficient selection process of young firms. A much deeper investigation on this point will be carried out in Section 3.

Finally, notice that, if one excludes the extreme quintiles, relative productivity indexes of entrants are almost uniformly distributed. This result does not support the basic vintage story, even if highly productive firms are slightly more numerous (Quintile 5). However, looking at Figure 3 mitigates somewhat this finding. On this figure, the dotted line depicts the dynamics of firms' average TFP relative to the industry ($ln\widetilde{TFP}_{it}$ in Equation 3) whereas the plain line represents the dynamics of firms' average TFP relative to the first year they enter the dataset. Formally,

$$\ln \widehat{TFP}_{it} = \ln TFP_{it} - \ln TFP_{it_0} \tag{4}$$

where $lnTFP_{it_0}$ stands for the TFP of firm i for the first year she appears in our sample. Figure 3 shows that recent cohorts enter with significantly higher productivity than earlier entrants did, while surviving cohorts show significant increases in productivity as they age. On average, entrants are around 0.6% more productive than the overall industry. This relative advantage, significant at 5% level (see Table 4), increases to 1.2% when firms reach three years of existence and then begins to decline monotonically over a decade to the industry average. Thus, if the data do not support a pure vintage model, they rather militate for a model of industry dynamics in which learning effects and vintage effects interact to drive aggregate productivity growth (Baldwin and Rafiquzzaman, 1995).

[Figure 3 about here.]

To complete the picture, Table 4 and Table 5 provide additional information on the dynamics of young firms. Altogether, our findings are consistent with the results now well documented in the empirical literature (Caves, 1998). Entrants are significantly smaller than incumbents (around 35% on average) and dramatically less capital-intensive (almost 50% on average). This lack of available productive capital translates into a significant disadvantage in labour productivity (-5.5%) despite the relative advantage in TFP previously mentioned.

[Table 4 about here.]

[Table 5 about here.]

Surviving firms grow rather quickly and, based on an impressively high investment rate, double their capital-labour ratio within eight years, caching-up with the average level of labour productivity. This catching-up process concerns surviving firms exclusively. Of notable importance is the finding that whereas there is substantial productivity growth relative to the industry for young firms within the first few years of existence, relative productive efficiency is not a crucial element of young firms' survival (Table 3). This calls for the need to investigate the question of market selection along the firm life cycle . This question is at the heart of the next section.

3 Market Selection Along the Firm Life Cycle

3.1 Econometric Models

We estimate a discrete duration model for grouped data following the approach first introduced by Prentice and Gloeckler (1978). Suppose there are firms $i = 1, \ldots, N$, who enter the industry at time $t = 0$. The hazard rate function is defined as the probability of failure in interval $t-1$ and t divided by the probability of surviving at least until $t-1$. The hazard rate function for firm i at time $t > 0$ and $t = 1, , T$ is assumed to take the proportional hazard form: $\lambda_{it} = \lambda_0(t) \cdot X'_{it}\beta$, where $\lambda_0(t)$ is the baseline hazard function and X_{it} is a series of time-varying covariates summarizing observed differences between firms. The discrete time formulation of the hazard of exit for firm i in time interval t is given by a complementary log logistic function such as:

$$h_t(X_{it}) = 1 - \exp\left\{-\exp\left(X'_{it}\beta + \theta(t)\right)\right\} \tag{5}$$

where $\theta(t)$ is the baseline hazard function relating the hazard rate $h_t(X_{it})$ at the t^{th} interval with the spell duration (Jenkins, 1995).

This model can be extended to account for unobserved but systematic differences between firms. Suppose that unobserved heterogeneity is described by a random variable μ_i independent of X_{it}. The proportional hazards form with unobserved heterogeneity can now be written as :

$$h_t(X_{it}) = 1 - \exp\left\{-\exp\left(X'_{it}\beta + \theta(t)\right) + \mu_i\right\} \tag{6}$$

where μ_i is an unobserved individual-specific error term with zero mean, uncorrelated with the X's. Model (6) can be estimated using standard random effects panel data methods for a binary dependent variable, under the assumption that some distribution is provided for the unobserved term. In this paper, we assume that μ_i is distributed Normal[9]. Besides, we perform a likelihood ratio test between the unrestricted model (with unobserved heterogeneity) and the restricted model (without unobserved heterogeneity). The reported estimates are chosen from the LR test.

We expect the hazard of exit to depend primarily on firm performance. We define firm performance in terms of profitability and productivity. First, we define profitability as the ratio of operating cash flow over assets[10]. Because operating cash flow can be negative and values in log will be entered as regressors, we transform the variable by adding to it its minimum value plus one. Next, we control for negative profits by adding to the vector of independent variable a dummy variable set to unity if the firm witness negative profitability, 0 otherwise. However, we do not set the threshold value of profits to its accounting value, i.e. in concrete words, operating cash flow must be above zero. Rather, we define the indicator variable on negative profit to be equal to unity if the operating cash flow does not outweigh the interests charges on debts, 0 otherwise. This dummy variable attempts to grasp more accurately the short-run break even condition that price covers average variable costs. We expect profitability to be the main explanation for firm survival, and should impact negatively on the hazard of exit. The reason for this is that profitability is both the utmost condition and the chief objective for firms to survive and expand their activities. Productivity should play a similar role with respect to survival, albeit in a more subtle way. Productivity impacts on profitability: higher productive efficiency means lower unit costs, boosting positively firm operating income in the short-run. Thus the inclusion of both profitability and productivity as explanatory variable for firm survival dictates that both be independent from one another. In order to account for this, we extract the residual of profitability P as follows:

$$\ln P_{it}^{u|tfp} = \ln P_{it} - \ln \widehat{P}_{it} \tag{7}$$

where

$$\ln \widehat{P}_{it} = E[\ln P_{it} | \ln TFP_{it}] = \widehat{\beta} \times \ln TFP_{it} \tag{8}$$

and

$$\widehat{\beta} = \frac{\ln P_{it} - \left(\alpha + \sum_{jt} \delta_{jt} \times (S_j \cdot D_t) + \mu_i + \varepsilon_{i,t} \right)}{\ln TFP_{it}} \tag{9}$$

where P stands for profitability of firm i at time t, and is defined as the ratio of operating income over assets and both S_j and D_t are indicator variables for sector S and year D, respectively.

However, we do not expect all performance variables to have a similar effect, depending on their age. Imagine that market competition for incumbents and entrants differ in systematic ways. As documented in Section 2.2, entrants suffer from significantly higher hazard rates. In fact, the idea that young firms are more fragile is barely new. It has been repeatedly documented that in the early years of existence, young firms cope with a significantly lower survival rate than incumbents. Reasons point both to firm-level characteristics such as smaller size for young firms, structure of ownership (Audretsch and Mahmood, 1999) and access to financial resources (Aghion et al., 2006) and to industry characteristics such as the minimum efficient scale, technological regime (Audretsch, 1991) and the stage of the industry life cycle (Argawal and Audretsch, 1995). Therefore, we expect productivity to deter firm exit for incumbents, i.e. boost firm survival, whereas we expect no particular effect for entrants.

We include a set of variables controlling for market structures which may steer firm exit beyond and above the presumably chief role of firm performance.To do so, we defined industries at the three-digit level, decomposing French manufacturing into 53 classes. The goal of not using wider classes is to define markets around more homogeneous product classes. Although this remain far from a fully-sketched product definition, as in Klepper (2002*b*) for example, this finer level of industry definition should prove more satisfactory than the two-digit level.

We start by following Mata and Portugal (1994); Mata et al. (1995) and define a series of additional variables both in static (market structures) and dynamics (industry turbulence) terms. We define market structures by measuring the size of the market (computed as the sum of sales by firm belonging to the four-digit industry) and the Herfindahl concentration index (defined as the sum of the squared market shares). Interpreting them as an indirect measure of industry maturity, we expect both measures to relate negatively to firm exit. We also provide an *ex ante* measure of barriers to entry following the methodology defined by Lyons (1980)[11]. Industry dynamics characteristics aim at grasping the turbulence of an industry. As mentioned earlier, industry life cycles implies that the stage in which an industry is may potentially affect firm exit differently according to their age. Thus one should control to some extent the degree of turbulence or conversely maturity of the industry. We define market growth as the growth rate of industry sales. The assumption here is that larger growth rates should equate with more frequent market opportunities. We also control for the number and the average size of entrants to control for an *ex post* (thus indirect) measure of barriers to entry. First, entry represents a threat for incumbents, so that in industries with a high entry rate, we would expect firm lifetime to be shorter, i.e. we expect a positive sign on firm exit. In industries with a high entrant size, barriers to entry are higher so that we expect firm lifetime to be longer (negative sign on firm exit).

[Table 6 about here.]

Before dwelling into commenting the results, we look at the persistency of all variables by regressing the explanatory variables on themselves. The idea here is that in order for firm to decide to withdraw from the market, it must be shown that the observation of their current performance provides them with reliable information of their stream of all expected future profits. In order for these variables to be economically meaningful, we must start by revealing their persistency (6). We observe that the variables characterising firm performance are all very persistent, notably $\ln P_{it}^{u|tfp}$ and TFP. In fact, we must expect high persistency in firm productivity, since the latter is conditional on the firm's workforce, capital stock and a vector of unobserved but persistent characteristics such as the organisation of productive tasks, the presence of labour union and additional management practices.

3.2 Results

Table 7 reports the results for different specifications, introducing all explanatory variables sequentially. All models originally control for unobserved heterogeneity as specified above. Looking at the LR test for $\rho = 0$, the unrestricted models accounting for unobserved heterogeneity is preferred to all restricted specification without unobserved heterogeneity. For the sake of clarity, we compute marginal effects in three steps. In the first step, we computed the mean probability of exit (mean hazard rate $h^{\overline{x}}$ for the average, i.e. representative, firm with mean age and for the mean year. In the second step, we measured a second probability of exit adding one standard deviation to the average value of the considered explanatory variable $h^{\overline{x}+\sigma_x}$, holding all other explanatory variables at their average value. Lastly, we computed the difference in percentage between both probability $(h^{\overline{x}+\sigma_x} - h^{\overline{x}})/h^{\overline{x}} \times 100$. For the qualitative variable indicating negative profits (Profit< 0), the difference is computed between probabilities with null or positive profit (Profit$< 0 = 0$) and negative profit (Profit$< 0 = 1$).

We start by introducing profitability as the sole explanatory variables, together with the indicator variable pointing firms recording a negative operating income. We find profitability to boost firm survival in two ways. First, profitable firms are more likely to remain on the market (-0.137). In terms of marginal effect, a negative departure of one standard deviation from the sample mean of profitability raises the probability of exit by a considerable 40%. Most importantly, we also find the probability of exit to rise significantly when profits are negative (+0.660), increasing by 88% the probability of exit with respect to firms with positive operating cash flow. Looking at the full specification (Column 5), the marginal effect reaches 134%. Altogether, profitability affects significantly the hazard rate of exit in the expected direction and magnitude.

In Column (2), we introduce TFP as an supplementary explanatory variable. The addition of productivity adds significant information, as shown in the LR test. We find all variables to be significant, with productivity affecting negatively the hazard rate of exit. Textbook economics tells us that this had to be expected, since it implies that more efficient firms are more likely to survive and remain on the market. However as stressed earlier, the introduction of both profitability and productivity makes it hard to separate the effects of both productive efficiency and profitability, irrespective of TFP. Therefore, in Column (3), we amend the model in two ways. First, we introduce profitability net from the contribution of TFP, as specified in Equation(7). Second, we distinguish between positive and negative profitability (net from TFP) by interacting the indicator variable on negative profits with $\ln P_{it}^{u|tfp}$. We do this in order to account for possible non linearities in its impact on the hazard rate of exit. Whereas we should expect negative profitability to depend largely on *how negative they are*, the effect of positive profitability on firm survival should be looser, for once profits are positive, the remuneration of all production factors is secured.

Looking at Column (3), we observe that the new specification adds significant information (LR=9.4) and all variables are significant. The effect of TFP impact negatively on the probability of exit (-0.577), implying that markets select against less efficient firms. A one standard deviation move above the representative firm decreases the probability of exit by 7.5%. Interestingly, we find the effect of negative profits to be far more dramatic than positive ones. A one standard deviation below the average value of negative profit is associated with a 13% increase in the probability of exit, whereas a one standard deviation above the average value of positive profit is associated with a 3.5% decrease in the probability of exit. Note that as we introduce more explanatory variables in subsequent regressions, the parameter estimate for positive profitability becomes decreasingly significant. Altogether, it appears that the overall effect of profitability is far larger than productivity, for the overall effect of negative profits is to increase the firm probability of exit by 143%. These results should come as no surprise: profitable firms ought to remain on the market, whereas variations in firm profitability due to micro-, meso- and macro-economic shocks may have dramatic consequences for firm survival. These results hold strongly across alternative specifications displayed in subsequent columns.

[Table 7 about here.]

In Column (4), we include all variables describing the sectoral characteristics: (the log of) the size of the industry; (the log of) the Herfindahl index; (the log of) the Minimum Efficient Scale (MES, computed as the sum of firm sales, by year and industry). First, the role of market concentration (Herfindahl) is hard to grasp, for we observe a versatile sign looking at both columns (4) and (5). In fact, concentrated industries are in a traditional sense imperfect markets, which should boost the survival of incumbents with strong market power and increase the probability of exit for firms with low market power. Thus the effect of market concentration conjugates these two opposite forces, which may in turn produce the instability in the role of concentration. We return to this issue further below. Second, we find that MES boosts the survival of incumbent firms (-0.141): in industries where MES is one standard deviation higher than the representative industry, the probability of firm exit decreases by a significant 6%. In fact, as a measure of barriers to entry, MES must act as a hindrance of the threat of new firms over incumbents.

Industry size has a similar effect (-0.046), implying that in industries with a turnover value of one standard deviation higher than the representative industry, the probability of firm exit decreases by a significant 3%. There are two alternative, perhaps opposite, interpretations. First, large sectors (in terms of sales) offer a wide range of unexplored but available market opportunities which are yet to be exploited. This would allow all types of firms to benefit from first mover advantage from these unexplored niches. It is not clear whether incumbents or entrants are better able to seize such opportunities, for this depends on initial sunk costs, barriers to entry, the minimum efficient scale and the technological competencies needed to fulfil these niches. The second takes the opposite path. In this case, industry size acts as proxy for the maturity of industry. With little or no room for additional entrants, all incumbent firms operate near or at equilibrium, so that the industry turnover rate is low. Thus the observed coefficient could also indicate industry maturity. It is not easy to say which effect dominates, but we will come back to this issue when we investigate the stability of the selection mechanisms by distinguishing entrants from mature firms. In the absence of controls for industrial turbulence, it is not clear whether industry size grasps numerous market opportunities, allowing incumbents to survive and expand, and/or whether industry size catches stabilised markets with low firm turnover. Note that the impact of industry size doubles in our preferred specification, where the probability of exit diminishes by almost 6%.

Pushing further the analysis of the influence of industry characteristics on market selection, we include in Column (5) the variables describing industry turbulence in terms of market growth rate, the number and the mean size of entrants. Rapidly expanding industries offer numerous niche opportunities, which in turns increases firm survival. A one standard deviation above the average market growth rates decreases the probability of exit by 4.7%. Industries where entrants are large also associate with a lower probability of exit of 6.8%. The largest marginal effect is found for the number of entrants (+11%): industries with numerous entrants equates with numerous exits of firms. In fact, this result illustrates a common finding specifying that the rates of entry and of exit tightly correlate Caves (1998). Note that effect of the Herfindahl index on the hazard of exit is both significant and positive. This suggests that concentrated industries boost the selection of firms. This should be expected: processes of industrial concentration naturally translate into a lower number of firms by boosting firm exit.

Altogether, our results suggest that the chief reason for firm selection is profitability. If firms are profitable to the point where they can remunerate their production factors, they deal with significantly higher chances of survival. When looking at the role of productivity alone, we also find that markets select according to what theory tells us, for markets select out less efficient firms. Market structures and industry turbulence also have a say. Imperfect markets in terms of industry size and barriers to entry equate with higher firm survival for incumbents. Industry growth and firm entry also influence the hazard rate of exit, albeit in opposite directions. Lastly, we find the effect of the role of market concentration to depend on the econometric specification. Notably, the fact that the control for industry turbulence modifies its effect is suggestive that market concentration has a differentiated effect on firms, depending on their market power. Firms with high market power should benefit from concentration in terms of survival. Firms with a low market power, typically young firms, should suffer from market concentration, dragging down their probability of making it to the next period.

To address this issue directly, we decompose the population of firms into age classes: from age 1 to 3, from age 4 to 9, and 10 years old or more. The objective of such decomposition is to investigate whether the market selection forces operate equally over different age classes. The idea is that the fate of firms may be determined by different factors both at the firm and at the sector level, depending of the firm's age. Table 8 displays the results, looking at the whole population of firms (Column 5, replicated from table 7) and for different age classes. Because it is hard to compare the parameter estimate *per se*, we computed the marginal effect of each variable on the hazard rate of exit, displayed in Table 9. Looking at both tables, interesting insights emerge.

[Table 8 about here.]

We first look at the effects of the firm's performance variables on the hazard of exit. The most immediate observation is that the chief reason for firm exit is to record a negative operating cash flow, across all types of firms. On average, a negative operating cash flow more than doubles the probability of exit (+134.0%, which equates with a multiplication of the probability of exit by a factor of 2.34). Importantly, this effect becomes more dramatic with firm age. Whereas the fact of having negative profit almost doubles the hazard rate of young firms (+86.1%), it triples that of old firms (+200.8%). These figures may appear considerably large, but their economic meaning is crystal clear. Market selection operates o that the decision to exit is first and foremost determined by the capacity of firms to generate profits. This conditions becomes critical when firm grow. A similar pattern where the generation of profits becomes critical as firm grow older is observed for the continuous quantitative variable on negative profitability, although the magnitude is far less dramatic. Interestingly, the extent to which firms can generate positive profits impacts significantly on older - not young - firms. The second observation is that if globally manufacturing markets screen out less efficient firms, the consequence of a negative productive efficiency gap on firm survival grows with age. For old firms, productivity is negatively associated with the hazard of exit, suggesting that moves away from productive efficiency are particularly painful and may translate into a lower profitability, and eventually into exit from the market. For young firms instead, TFP plays no particular role.

These results are suggestive that firm performance, either profitability or productivity, becomes gradually more critical for firm survival as the firm grows. We interpret this is two ways. First, this reflects the opportunity costs of remaining on the market, that is, the difference between the economic definition of profits comprising opportunity costs and the accounting definition of profits. Clearly, our results suggest that the opportunity costs of remaining on the market grows with firm age, moving the cursor of the minimum level of profitability to the right of the distribution. Second, the difference simply reflects the fact that young firms are more exposed to market selection, so that the relationship between firm performance and survival becomes looser. In other words, the micro-economic determinants of markets selection of young firms must be found elsewhere, such as firm size Audretsch and Mahmood (1999) and, again, credit constraints Aghion et al. (2006).

Now turning to the effects of market structures in firm survival, we observe two main results. Overall, we find market structures to impact mainly on young firms rather, not on old firms. Market concentration impact positively on the probability to exit for young and middle-aged firms. Old firms instead are insensitive to it. This reflects both the positive correlation between firm age and firm size, and the positive association of firm size with survival rates. Since older firms are generally larger, they contributes positively to the concentration of the industry, while they are hard to market contest. The puzzle comes from the minimum efficient scale. We would expect MES to have a negative influence on the survival rate of young firms. Such newly establishes companies generally operates under the suboptimal scale, dragging profitability downwards. This surprising results is similar to Audretsch (1991), who then argues that since high-MES industries are usually associated with high price-costs margin, firms operating under the optimal scale of production may in the short-run from benefit from it. These results are at least consistent that the observation that entry is not fully deterred in highly capital intensive industries. However, such results have not been further corroborated Audretsch and Mahmood (1999). Finally, industry size is negatively associated with the hazard rate of exit of young firms. This pleads in favour of the idea that large sectors offer a wide range of unexplored market opportunities for entrants principally, boosting their survival rate.

Second, the most important effect of industry characteristics over firm survival is to be found not in the static dimensions (concentration, scale and size), but on the dynamic features. The largest effect is observed for the number of entrants, where a one standard deviation above the average value of the number of entrants increase the probability of exit of young firm by 16% and 12% for middle-aged firms. Large firms are not statistically influenced by the number of entrants. In fact, this results simply echoes the observation that entry and exit rates highly correlates. Thus young and middle-aged firms find it harder to survive in turbulent industries, not old firms.

Industry growth exhibit that high market growth exert a positive influence on young and old firms, not on middle aged firms. In fact, if age and market opportunities can be considered as acceptable proxies for respectively firm size and technological opportunity, this result may be a replication of the Schumpeterian debate on the relationship between firm size and innovation. In our case, young firms benefit from flexibility and reactivity, allowing them to occupy strategic niches, whereas large ones may enjoy their size advantage in terms of higher internal economies of variety. This suggests that both young and old succeed in seizing market opportunities., but in rapidly growing industries, the critical age remain the grey era where firms need to scale up their operation with neither flexility nor economies of variety.

[Table 9 about here.]

These findings suggest the existence of a two-tier market structure. The first layer is that of rather stable large firms, i.e. incumbents, for which competition is mainly based on price competition, implying that departures from productive efficiency may prove harmful. Such firms are not very sensitive to market structures, the reason being that they themselves define the bulk of the industry. This fine and stable layer differs from the second, more turbulent, layer. Entrants are subjugated to market structures. With the exception of the number of entrants, all industry characteristics have a significant effect on firm exit.

Altogether, our findings suggest that several games are played in the same courtyard and that selection mechanisms may differ depending on firm age. The first game is the one played by incumbents among themselves. It relies heavily on productive efficiency, profitability and competition with rather stable and well identified competitors. In this case, market selection operates according to what textbook economics tells us: less efficient firms are driven out of the market. The second game is the one played by both incumbents and new entrants. This game is imperfect in nature as failing entrants are on average more efficient than surviving incumbents. As a whole, entrants are significantly more affected by market structures.

4 Conclusion

In this paper we have analysed market selection in French manufacturing goods markets over the last decade. We have investigated this issue under the hypothesis that the competitive challenges which firms have to face may change along its life cycle. Our empirical investigation led us to the following results. In accordance with most of the industrial dynamics literature, we found that, exiting firms, as a whole, display below-average performance levels and are smaller than their surviving counterparts. Thus micro data on French manufacturing industries show an average behaviour consistent with a common view that market selection favors the most efficient firms.

However, the institutions that help markets to rightly operate this selection process may be more severe for young firms. Young firms are challenged not because of their relative efficiency - they rapidly reveal themselves more efficient than old firms - but in terms of industry concentration and turbulence. This does not amount to saying that mature firms are free from competition. Rather, they face the challenge to continuously renew their productive efficiency and economic profitability, since those who fail to do so are forced to eventually exit the market. This result may reveal that, as far as mature firms are concerned, French markets select against persistent bad performers and not against temporary losses of efficiency.

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Notes

[1] In putting the focus on the distinction between young and mature firms, we come close to the literature that emphasised the distinction between small and large firms (Audretsch et al., 1999).

[2] In this model, learning is said to be *passive* because information is obtained as a costless by-product of operating and also because learning does not affect the actual productivity of the firm. It simply reveals the pre-determined and time-invariant relative efficiency of the firm.

[3] In this model, learning is said to be *active* not only because it requires specific efforts but also because it allows the firm to improve its relative performance.

[4]For instance, a firm reduces its number of workers and falls out of the range of the French census, but still exists in the market.

[5]this problem concerns only the smallest firms in the sample and should not greatly bias the inputs or output-weighted entry and exit rates. Usually, input or output weighted turnover rates represent a half of firm turnover rates, see Bartelsman et al. (2005)

[6] We estimate the hazard function by the ratio between the number of firms which left the market at age j divided by the total number of firms of age j.

[7] See Caves (1998) and Bartelsman et al. (2005).

[8] Formally, $\ln \overline{TFP}_t = \frac{1}{n} \sum_{i \in I}^{n} \ln TFP_{it}$.

[9]See Chapters 17 and 18 of Cameron and Trivedi (2005) for a discussion on the appropriate choice of distribution for the parameter of unobserved heterogeneity.

[10] Operating cash flow is defined as earnings before interest, taxes, depreciation and amortization, derived from the company's income statement. Firm asset is defined as a company's common stock equity, i.e. total assets from which we subtract liabilities, preferred stock, and intangible assets.

[11] In simple terms, MES is defined as the logarithm of one half of the average size of the firms that, on average, operate 1.5 establishments within an industry

A Main Variables Used in TFP Computation

All nominal output and inputs variables are available at the firm level. Industry level data are used for price indexes, worked hours and depreciation rates.

Output

Gross output deflated using sectoral price indexes published by INSEE (French System of National Accounts).

Labour

Labour input is obtained by multiplying the number of effective workers (i.e. number of employees plus number of outsourced workers minus workers taken from other firms) by average worked hours. The annual series for worked hours are available at the 2-digit industry level and provided by *GGDC Groningen Growth Development Center*). This choice has been made because there is no data on hours worked in the EAE survey. Note also that a large drop of worked hours occurs between 1999 and 2000 because of the specific "French 35 hours policy" (On average, worked hours fall from 38.39 in 1999 to 36.87 in 2000).

Capital input

Capital stocks are computed from investment and book value of tangible assets following the traditional perpetual inventory method (PIM):

$$K_t = (1 - \delta_{t-1})\, K_{t-1} + I_t \tag{A-1}$$

where δ_t is the depreciation rate and I_t is real investment (deflated nominal investment). Both investment price indexes and depreciation rates are available at the 2-digit industrial classification from INSEE data series.

Intermediate inputs

Intermediate inputs are defined as purchases of materials and merchandise, transport and traveling, and miscellaneous expenses. They are deflated using sectoral price indexes for intermediate inputs published by INSEE (French System of National Accounts).

Input cost shares

With w, c and m standing respectively for wage rate, user cost of capital and price index for intermediate inputs $CT_{kt} = w_{kt}L_{kt} + c_{It}K_{kt} + m_{It}M_{kt}$ represents the total cost of production of firm k at time t. Labour,capital and intermediate inputs cost shares are then respectively given by

$$s_{Lkt} = \frac{w_{kt}L_{kt}}{CT_{kt}} \; ; \; s_{Kkt} = \frac{c_{It}K_{kt}}{CT_{kt}} \; ; \; s_{Mkt} = \frac{m_{It}M_{kt}}{CT_{kt}} \tag{A-2}$$

To compute the labour cost share, we rely on the variable "labour compensation" in the EAE survey. This value includes total wages paid to salaries plus income tax withholding, and is used to approximate the theoretical variable $w_{kt}L_{kt}$. To compute the intermediate inputs cost share, we use variables on intermediate goods consumption in the EAE survey and the price index for intermediate inputs in industry I provided by INSEE.

We compute the user cost of capital by using Hall (1988) methodology where the user cost of capital (i.e. the rental price of capital) in the presence of a proportional tax on business income and of a fiscal depreciation formula, is given by[12]

$$c_{It} = (r_t + \delta_{It} - \pi_t^e) \left(\frac{1 - \tau_t z_I}{1 - \tau_t} \right) p_{IKt} \tag{A-3}$$

where τ_t is the business income tax in period t and Z_I denotes the present value of the depreciation deduction on one nominal unit investment in industry I. Complex depreciation formula can be employed for tax purposes in France. To simplify, we choose to rely on the usual following depreciation formula

$$z_I = \sum_{t=1}^{n} \frac{(1 - \bar{\delta}_I)^{t-1} \delta}{(1 + \bar{r})^{t-1}}$$

where $\bar{\delta}_I$ is a mean of the industrial deprecation rates on the period 1984-2002 and $\bar{r}$ is a mean of the nominal interest rate on the period 1990-2002.

Table 1: Entry and Exit by Year

Year	Entrant	Continuing	Exiting	Turnover rate
1990	1 887	19 351	1 738	18.7
1991	2 130	19 181	2 057	21.8
1992	1 683	18 896	2 415	21.7
1993	1 157	18 295	2 284	18.8
1994	1 961	17 785	1 667	20.4
1995	1 511	17 816	1 930	19.3
1996	1 644	17 679	1 648	18.6
1997	1 626	17 828	1 495	17.5
1998	1 374	18 007	1 447	15.7
1999	1 304	17 911	1 470	15.5
2000	1 345	17 758	1 457	15.8
2001	1 464	17 617	1 486	16.7

Table 2: Turnover Rates by Industry

Industry	Number of Firms			Labour		
	Entry	Exit	Sum	Entry	Exit	Sum
Clothing and footwear	9.2	15.2	24.4	5.1	9.3	14.4
Printing and publishing	9.2	11.0	20.1	5.4	6.6	12.1
Pharmaceuticals	8.1	8.4	16.6	4.3	6.2	10.5
House equipment and furnishings	8.3	10.4	18.8	4.8	5.9	10.7
Automobile	7.3	7.1	14.4	7.2	6.6	13.8
Transportation machinery	8.9	9.4	18.2	5.5	3.5	9.1
Machinery and mechanical equipment	9.7	9.8	19.5	5.0	5.5	10.6
Electrical and Electronic equipment	11.9	12.4	24.2	5.4	5.4	10.8
Mineral industries	7.6	8.6	16.2	3.9	4.7	8.6
Textile	7.6	10.0	17.6	4.7	6.5	11.3
Wood and paper	8.0	9.0	17.1	4.8	5.8	10.6
Chemicals	8.1	7.1	15.2	3.9	3.8	7.8
Metallurgy. Iron and Steel	8.0	7.9	15.9	6.1	5.2	11.3
Electric and Electronic components	9.5	8.9	18.4	5.2	5.7	10.9

Table 3: Relative TFP Distributions

Quintile	Age =1		Age = 13	
	Stayers	Exitors	Stayers	Exitors
1	21.28	23.02	19.92	34.44
2	17.27	18.10	21.15	19.52
3	17.80	17.18	20.93	14.92
4	19.90	18.21	19.85	16.76
5	23.75	23.50	18.15	14.36
	100.00	100.00	100.00	100.00

Table 4: Performance Relative to the Industry Average (in %)

Age	n	TFP	LP	L	K/L
1	15,695	0.57	-5.52	-34.28	-47.95
2	13,630	0.85	-4.54	-28.61	-40.35
3	12,188	1.17	-3.02	-23.72	-32.25
4	11,359	1.00	-2.35	-20.82	-25.22
5	10,540	0.94	-1.58	-17.54	-19.21
6	9,742	0.77	-1.24	-15.10	-13.32
7	8,942	0.57	-0.89	-11.86	-7.74
8	7,542	0.47	*-0.69*	-9.61	-4.26
9	6,400	0.38	*-0.04*	-7.38	*-0.89*
10	5,347	0.39	*0.26*	-4.23	2.75
11	4,653	0.32	*0.06*	-3.80	5.75
12	3,841	*0.23*	*0.71*	*-1.53*	8.89
13	3,085	*-0.10*	*0.70*	*0.90*	13.97

Values in italics are not significantly different from zero at 5% level.

Table 5: Performance Relative to the Entry Year (in %)

Age	n	TFP	LP	L	K/L
1	15,695	0.00	0.00	0.00	0.00
2	12,951	1.10	3.64	3.82	20.94
3	10,158	1.73	6.09	8.38	36.92
4	8,257	2.05	8.49	12.16	50.89
5	6,797	2.28	10.69	16.29	64.28
6	5,656	2.64	12.86	20.22	75.98
7	4,573	2.73	14.28	23.60	88.39
8	3,626	3.01	16.50	26.74	100.85
9	2,852	3.55	20.11	28.66	116.31
10	2,077	4.34	23.12	29.95	132.81
11	1,620	5.22	27.23	31.99	148.22
12	1,032	5.54	30.05	33.07	174.41
13	459	6.11	33.37	32.10	185.92

All Values are significantly different from zero at 5% level.

Table 6: Persistency in Variables (OLS on The Lagged Value of Variables)

	β	N	R^2
Profitability (Log)	0.769	174,416	0.57
Residual of Profitability (Log)	0.773	174,416	0.58
TFP (Log)	0.764	174,416	0.57
Labour Productivity (Log)	0.912	174,416	0.83
Herfindahl (Log)	0.869	583	0.83
Minimum Efficient Scale - MES (Log)	0.607	583	0.37
Market Size (Log)	1.011	583	0.99
Market Growth (Log)	0.158	583	0.03
Mean Size of Entrants (Log)	0.374	583	0.14
Number of Entrants (Log)	0.873	538	0.75

Table 7: Sequential Regressions for Firm Survivals

	(1)	(2)	(3)	(4)	(5)
Profit (log)	-0.137	-0.101			
	[0.025]***	[0.025]***			
Profit < 0 (Dummy)	0.660	0.633	0.881	0.891	0.895
	[0.018]***	[0.018]***	[0.071]***	[0.071]***	[0.071]***
TFP (Log)		-0.396	-0.577	-0.543	-0.498
		[0.058]***	[0.063]***	[0.064]***	[0.064]***
Res. of Profit.(Log) (>0)			-0.061	-0.058	-0.045
			[0.026]**	[0.026]**	[0.026]*
Res. of Profit. (Log) (<0)			-0.319	-0.323	-0.322
			[0.069]***	[0.069]***	[0.069]***
Herfindahl (Log)				-0.019	0.056
				[0.007]**	[0.011]***
MES(Log)				-0.141	-0.100
				[0.017]***	[0.018]***
Market Size (Log)				-0.046	-0.086
				[0.012]***	[0.014]***
Market Growth (Log)					-0.723
					[0.151]***
Mean Size of Ent. (Log)					-0.095
					[0.011]***
Number of Ent. (Log)					0.114
					[0.014]***
Observations	209,005	209,005	209,005	209,005	208,535
Number of firms	34,589	34,589	34,589	34,589	34,585
Log Likelihood	-57,825.3	-57,802.0	-57,797.3	-57,755.3	-57,543.2
LR test[a]	1,807.4***[b]	46.6***	9.4***	84.0***	424.3***
ρ	0.066	0.066	0.066	0.065	0.061
LR test for ρ=0	57.5***	60.4***	60.5***	59.8***	53.9***

Link function: complementary log-log with unobserved heterogeneity. Non parametric baseline hazard Function. All models include a full vector of time dummies, year dummies, age at entry, and an indicator variable for the firm's presence in the database starting year 1984. Standard errors in brackets.
* significant at 10%; ** significant at 5%; *** significant at 1%
[a] LR test on previous column
[b] LR test on model without profitability variables

Table 8: Market Selection Along The Firm Life Cycle

	(5)	(6)	(7)	(8)
Age	All	$[1;3]$	$[4;9]$	$[10;+[$
Profit < 0 (Dummy)	0.895	0.682	0.861	1.145
	[0.071]***	[0.108]***	[0.117]***	[0.150]***
TFP (Log)	-0.498	-0.125	-0.573	-0.974
	[0.064]***	[0.097]	[0.104]***	[0.135]***
Res. of Profit.(Log) (>0)	-0.045	-0.043	-0.045	-0.116
	[0.026]*	[0.040]	[0.043]	[0.055]**
Res. of Profit. (Log) (<0)	-0.322	-0.252	-0.283	-0.560
	[0.069]***	[0.104]**	[0.114]**	[0.148]***
Herfindahl (Log)	0.056	0.068	0.070	0.026
	[0.011]***	[0.018]***	[0.019]***	[0.023]
MES(Log)	-0.100	-0.122	-0.105	-0.057
	[0.018]***	[0.030]***	[0.030]***	[0.031]*
Market Size (Log)	-0.086	-0.111	-0.111	-0.010
	[0.014]***	[0.023]***	[0.022]***	[0.026]
Market Growth (Log)	-0.723	-0.987	-0.108	-1.205
	[0.151]***	[0.251]***	[0.230]	[0.321]***
Mean Size of Ent. (Log)	-0.095	-0.108	-0.082	-0.072
	[0.011]***	[0.019]***	[0.018]***	[0.022]***
Number of Ent. (Log)	0.114	0.170	0.124	0.033
	[0.014]***	[0.025]***	[0.023]***	[0.027]
Observations	208,535	43,364	84,244	80,927
Number of firms	34,585	20,217	24,905	13,887
Log Likelihood	-57,543.2	-17,662.4	-19,833.2	-17,000.7
ρ	0.061	0.044	0.017	0.041
LR test for ρ=0	53.9***	114.7***	5401.3***	114.6***

See previous table footnote

Table 9: Marginal Effects of Firm performance and Industry Structure on the Hazard Rate of Exit (*Percent Change in the Probability of Exit*)

Age	All	[1; 3]	[4; 9]	[10; +[
Profit < 0 (Dummy)	134.0	86.1	126.6	200.8
TFP	-6.5	*-1.7*	-7.4	-12.0
Res. of Profit.(Log) (>0)	*-2.5*	*-2.4*	*-2.5*	-6.4
Res. of Profit. (Log) (<0)	-11.8	-9.4	-10.4	-19.8
Herfindahl	6.2	7.6	7.9	*2.8*
MES	-4.2	-4.7	-4.2	*-2.7*
Market Size	-5.7	-6.8	-7.1	*-0.7*
Market Growth	-4.5	-6.1	*-0.7*	-6.7
Mean Size of entrants	-6.8	-7.3	-5.7	-5.5
Number of entrants	11.6	16.3	12.6	*3.3*

Figures in *italics* mean non significance at 5% level

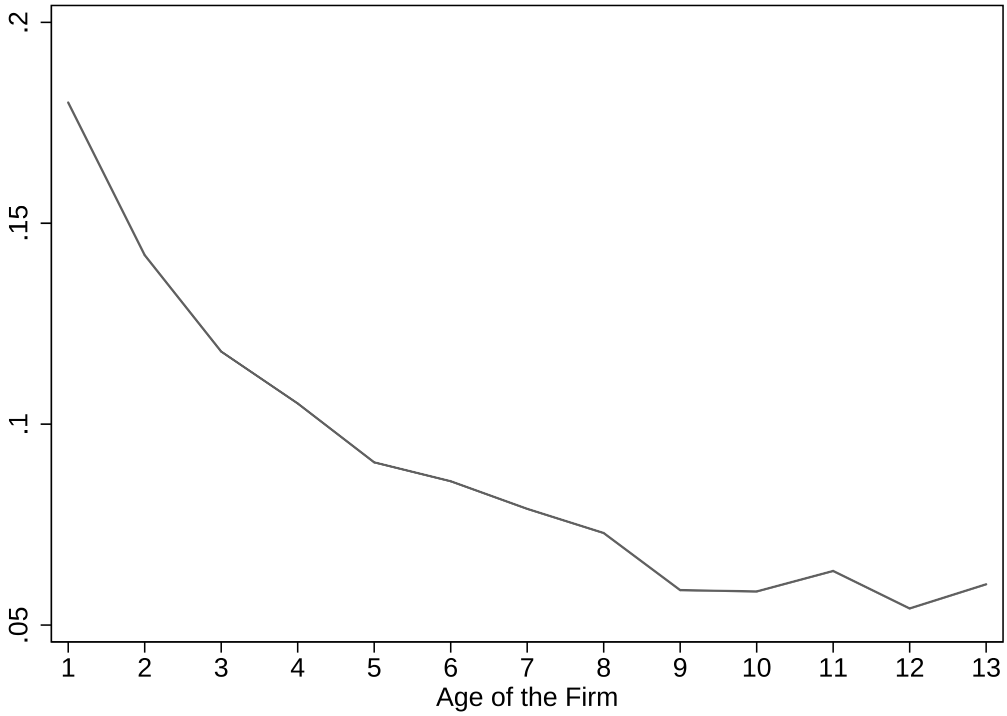

Figure 1: Hazard Function (years)

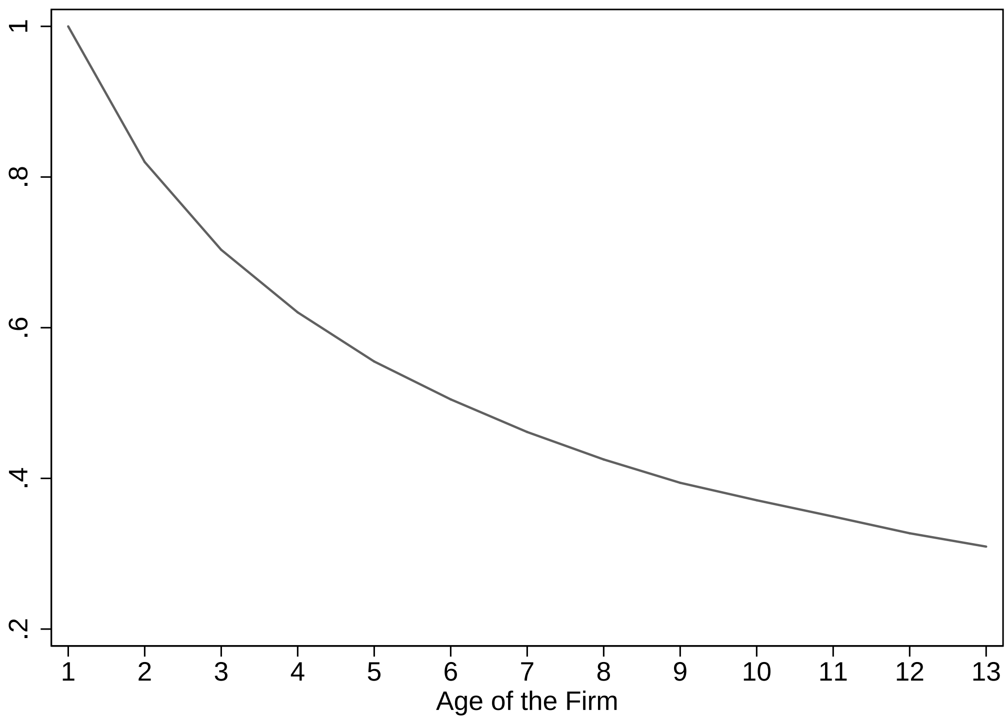

Figure 2: Survivor Function (years)

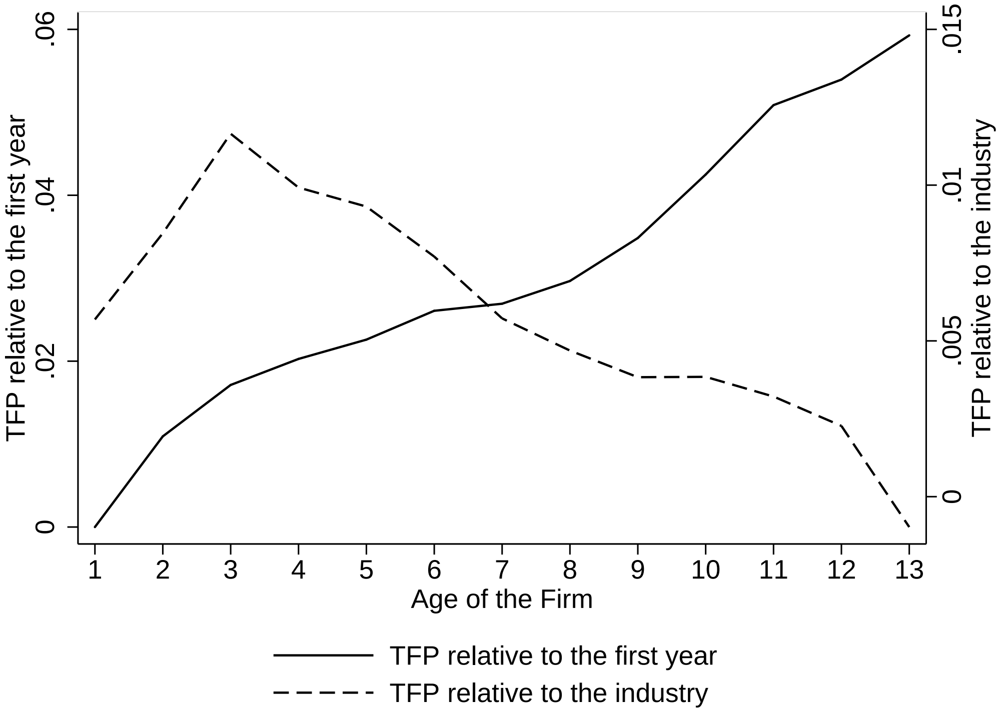

Figure 3: Post Entry TFP Performance (Log Difference)