DRUID Working Paper No. 07-11

Founding Conditions and the Survival of New Firms

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July 2007

Abstract:
We analyze the effects of founding conditions on the survival of new firms. We allow the effects of founding conditions to be transitory and estimate how long such effects last. Our findings indicate that founding effects are important determinants of exit rates. Moreover, in most cases, their effect on survival seems to persist without much of an attenuation for several years after the founding of the firm.

Key words: Survival of firms; founding effects
Jel codes: L25

ISBN 978- 87-7873-240-8

Acknowledgements
We are grateful to seminar and conference audiences in Bologna, Catania (SMS), Copenhagen (DRUID) Ghent, Lisbon (MIT-Portugal) and Michigan for helpful comments. Financial assistance from the ESRC, Fundação para a Ciência e Tecnologia and NOVA Fórum is gratefully acknowledged. The usual disclaimer applies.

I. INTRODUCTION

The notion that the conditions in which a firm is born may have a substantial effect on its performance is one that has received attention from different angles. While some studies, mainly inspired in the Organizational Ecology literature, emphasize the impact that environmental conditions at the time of founding may exert upon the survival of firms (Carroll and Hannan, 1989, Romanelli, 1989, Hannan, 1998, Ranger-Moore, 1997, Mitchell, 1994, Henderson, 1999), other studies have focused on the impact that those strategic choices at founding time may have upon the performance of firms. Eisenhardt and Schoonhoven (1990) showed that founding teams exert permanent effects upon the performance of firms, Cooper, Gimeno-Gascon and Woo (1994) found that the initial stocks of financial and human capital were good predictors of firm performance including survival, while Kimberly (1979) concluded that environmental conditions, the founder's personality, and the initial strategic choices exert an enduring effect on the behavior of organizations.

However, in many cases, founding and subsequent conditions can be similar. By definition, structural conditions do not change rapidly, and a tendency for organizations to stick with their strategies may hinder their rapid change (Miller and Chen 1994, Kratz and Zajac 2001). Failing to account for the effect of current conditions may lead one to draw the misleading conclusion that founding conditions are responsible for the observed variation in performance.

In this paper we develop a model that enables us to test the importance of both founding and subsequent conditions upon the survival of firms. Furthermore, while the literature has developed the hypothesis that founding conditions matter, to our knowledge there is no study that has analyzed how long the effect of these founding conditions upon survival may persist. Our analysis will specifically allow for the effect of founding conditions to gradually vanish over time, and we will be able to provide estimates of the degree of persistence of the effect of founding conditions.

Our results suggest that firm strategies, market conditions and macroeconomic conditions are all important determinants of survival. We further find that, in general, observed founding values of these variables matter more than current values and, in most cases, the magnitude of the impact of founding effects on survival does not diminish rapidly over the first 5 - 10 years of a new firm's life.

Our study has implications for managers and policy makers alike. For managers our results mean that a great deal of care should be taken in preparing the founding of a firm. The choices made at inception have long lasting effects and may not be easy to undo. For policy makers, the results are important because they suggest that the kind of support needed by struggling young firms would have to be tailored, cohort by cohort, to the circumstances of their birth.

The plan of the paper is as follows. In Section II, we outline the basic issues that we will be concerned with, and try to weave together two different literatures that have addressed them in somewhat different ways. In this section we develop our basic hypotheses about which effects should matter for survival and discuss the determinants of survival. Section III discusses the data that are the basis of our empirical analysis, while in Section IV the empirical model is presented. The results are discussed in Section V and finally, Section VI concludes the paper.

II. THE ISSUES

The effect of environmental conditions on the performance of firms has been the subject of much interesting work developed to explain the often fairly large shake-outs which occur in many relatively young markets. There are two rather separate streams of research in the strategy and organization literature on firm survival (Ranger-Moore, 1997, Mitchell, 1994, Henderson, 1999, Agarwal, et al. 2004, Delmar and Shane. 2004, Huyghebaert and Van de Gucht, 2004). The first stream originates in organizational ecology (Hannan and Freeman 1977). Central to this literature is the concept of density (Hannan and Freeman 1987), which suggests that exit rates increase with increases in competition and decrease with increases in legitimacy of organizations. The second stream of research has its origins in evolutionary economics (Nelson and Winter 1982). Scholars in this tradition stress that, over their life cycles, industries go through a number of stages in which technology and market conditions vary, determining how easy it is to enter and survive in a given market (Gort.and Klepper 1982, Klepper 1996, 2002, Suárez and Utterback 1995).

While in its original formulation, the density argument posits that changes in competition in one period should affect all organizations in pretty much the same way, the argument was further extended, suggesting that density at the time of founding could have imprinting effects upon organizations (Stinchcombe, 1965) and thus have delayed effects upon their survivability (Carroll and Hannan, 1989). The density delay argument thus suggests that organizations founded in periods when markets are very crowded (e.g. with other entrants and incumbents) are likely to have persistently higher age specific rates of mortality than those founded in less demanding periods when the market is less densely populated. Thus, if a population becomes very large in a certain period, organizations founded in that period are likely to be much weaker, *ceteris paribus*, and the adverse founding conditions into which they are born are likely to create an enhanced stream of exit (and, as a consequence, a falling off in population size from the peak previously established). There are two reasons for this effect. The first is that firms founded under such conditions may suffer from a "*liability of scarcity*". Organizations created in unfavorable circumstances are unlikely to be anywhere near their optimal structural configuration and, in addition, may not be able to find the right kind of resources, make the correct organization specific investments, or design the right kinds of routines. The second argument – "*tight niche packing*" – suggests that new firms founded in crowded market conditions can get pushed into unpromising niches, which may be transitory or may just lead them to develop knowledge and routines which are so specialized that they will never be able to subsequently reposition themselves into more favorable parts of the market later on.

An implication of the arguments given above is that the state of the environment at the time of birth largely determines the strategic choices of firms, but even if one is willing to accept that management may have some degree of discretion in deciding on their firms' strategies, there may still be imprinting effects, due to organizational inertia (Hannan and Freeman 1989). Therefore, even if initial strategic choices were appropriate, as firms age and the environment changes the initial choices of firms may become less and less suited to the new environment. However, the routines developed by firms until that moment, and that eased the tasks of dealing with the firms' daily operations, may create rigidities that make the firms ill-suited to cope with changes in their environments (Hannan 1998). The fact that a strategy has been successful in one moment in time can even exacerbate these rigidities. Managers' reluctance to abandon strategies that have been successful in the past leads to the continuity of the once successful strategies, even if the environment changes radically and those strategies are no longer appropriate (Audia, Locke and Smith 2000).

In the rest of this section we will develop the specific hypotheses to be tested in this study. We will start by developing the hypotheses concerning the environment in which firms operate, which will be followed by those relative to the strategies pursued by firms. For each factor affecting survival, we will discuss the rationale to expect the survival of firms to be related to current and founding conditions. The general hypothesis underlying the study is that, even after controlling for current conditions, founding conditions may have a long-lived impact upon survival. By long-lived we mean that the effect persists for a number of years; we do not necessarily mean that the effect of founding conditions will persist forever. The estimation of the longevity of each specific effect is an empirical issue, and will be left to the section in which our estimation strategy is discussed.

THE ENVIRONMENT

In its original formulation in the context of the organizational ecology literature, population density (the count of the number of firms in the market) is the most important determinant of how favorable market conditions are for new entrants. However, the notion of "crowding", which lies at the core of the arguments suggests that it is population density relative to market size which matters most, and this introduces a broader range of factors that might be important determinants of how favorable environmental conditions are for a particular cohort of firms (see Nickel 2004 for a survey of studies that analyze the death of organizations within the organizational ecology tradition and discuss the different variables that have been suggested as complements to the initial density). As we work with several industries with quite different structures, rather than with the evolution of a single industry over time, we will use industry concentration as a proxy for the degree of competition in the market. However, the same argument that says that organizations may be imprinted by the conditions they confront when they are established, can be extended to the overall business conditions, that is, the state of the business cycle (or other macroeconomic conditions).

Concentration

Two types of argument can be made about the effect of the degree of competition in the market upon survival prospects. On the one hand, Organizational Ecology scholars (e. g. Hannan and Carrol 1992), maintain that competition is a force that increases mortality. At low levels of density, an increase in the number of firms operating in a market translates into increased legitimacy and this will favor survival. After a certain threshold, however, further increases in the number of firms lead to increased competition and this leads to increased mortality.

While economists certainly agree that competitive markets (that is, those populated by a large number of firms) exert a strong disciplinary effect and drive inefficient firms out of the market, the Industrial Organization literature recognizes a complex effect of concentration. On the one hand, it argues that market concentration facilitates collusion, thus creating room for excess profits and making it easier to survive. On the other hand, in highly concentrated markets incumbents have higher profits to defend and coordination among them is easier. Incumbents may, therefore, be more likely to retaliate against entrants (Bunch and Smiley 1992). However, for reaping the benefits of being in a highly concentrated market, established firms may not maintain an aggressive behavior in a permanent fashion. Entrants that manage to survive their earliest days in the market, may be accepted in the club of incumbents and become protected by the umbrella effect of concentration.

Perhaps because of these conflicting effects, the available evidence relating the survival of firms to market concentration is inconclusive. Audretsch and Mahmood (1994) report a negative and statistically significant effect of market concentration on the survival of new firms, but Romanelli (1989), Mata and Portugal (1994) and Huyghebaert and Van de Gucht (2004) found that conventional concentration measures have an insignificant impact upon survival. Sharma and Kesner (1996) also report an insignificant effect of concentration upon survival, but found that the (negative) effect of concentration increases with the scale of entry. The arguments above lead us to hypothesize that

Hypothesis 1C *Current concentration facilitates survival* .

With respect to the effect of concentration at the time of entry, we will have two disparate hypotheses, originating respectively from Organizational Ecology and Industrial Organization. If the Organizational Ecology argument holds, entry in less competitive markets should have permanent life enhancing effects.

This ecological argument was extended by Swaminathan (1996). He argues that unfavorable founding conditions may lead to a quick and immediate shake-out of “unfit” firms, leaving those who survive their first year (or so) with a high average fitness level. A cohort that has experienced such a "*trial by fire*" is likely to have lower failure rates, meaning that adverse founding conditions and immediate selection may be followed by lower (not higher) exit probabilities for firms in that cohort (Swaminathan, 1996). This view leads us to expect that

Hypothesis 1Fa *Industry concentration at founding increases the probability of survival during the first years only.*

If the Industrial Organization collusive argument holds, entry and survival during the first years can be particularly difficult in highly concentrated industries. The nature of the argument implies that this effect should not be long lived, as concentration protects established firms. As soon as entrants become part of the established set of firms, the protective umbrella of concentration should dominate and protect them. This leads us to the prediction that

Hypothesis 1Fb *Industry concentration at founding decreases the probability of survival during the first years only.*

Entry Rates

Another element of the competitive structure of a market is the extent of entry in that market. Organizational ecologists and economists here agree that markets with high entry rates are those in which the highest exit rates are to be expected. The Organizational Ecology argument is that large entry flows increase density in the market and one should therefore expect high exit rates as a consequence. Industrial Organization Economics arguments, on the other hand, emphasize that entry barriers are exit barriers, and that the magnitude and irreversibility associated with investments, which deter entry, also hinder exit (Eaton and Lipsey 1980). Finally, evolutionary economists argue that there are distinct stages in the industry evolution, and that each stage exhibits different entry and exit rates. In the entrepreneurial regime (Winter 1994), the kind of knowledge needed to fuel innovation lies outside the industry and new firms need to be created in order for innovations to be possible. At the same time, no standards exist in the industry, and firms compete by experimenting with new ideas. Many of these ideas are unsuccessful, and those firms that promoted them are forced to exit. With the emergence of dominant designs (Suárez and Utterback 1995), industries enter the routinized regime, in which innovations are more of an incremental type and come from established firms. Fewer firms enter, but fewer exit as well (Gort and Klepper 1982).

Overall, there is plenty of evidence that industries where entry is easy are also industries where exit is more likely. Dunne, Roberts and Samuelson (1988) found that there is a very strong positive correlation between the flows of entry and exit across markets and many studies (surveyed in Siegfried and Evans 1994) have reported similar findings for the determinants of entry and exit. Mata and Portugal (1994) observed that this is due, in large part, to the early exit of entrants in industries characterized by high entry flows, a finding that was confirmed by Huyghebaert and Van de Gucht (2004). The effect of current entry upon the survival of firms comes from competition effect, which is shared by Organizational Ecology and Industrial Organization. Therefore, we will hypothesize

Hypothesis 2C *Current entry rates decrease the probability of survival.*

Comprehensive evidence for the US, reported by Dunne, Roberts and Samuelson (1988) show that that there is a positive correlation between flows of entry over time. Once current conditions have been controlled for, only Organizational Ecology arguments support a permanent effect of entry rates upon survival. Indeed, both the tight niche packing and the resource scarcity are likely to be particularly relevant when entry rates are high, as entrants are more likely to be direct competitors to other entrants than established firms. Therefore, we hypothesize

Hypothesis 2F *Entry rates at founding persistently decrease the probability of survival.*

The macroeconomic environment

The overall state of the economy has long been indicated as an important force driving firms out of business. When times are tough, established firms may face difficulties and the competitive pressure from new firms may lead them to exit. The first reason why current macroeconomic conditions may matter is because current conditions change expectations about the future. If the state of affairs in a market today is taken as an indication of future adverse state of affairs, firms may decide to exit in response to an unfavorable change in current conditions. Unfavorable current macroeconomic conditions may also lead firms to exit if they suffer from cash constraints, and if they cannot secure the funds required for survival, even though they would wish to remain active despite adverse conditions.

Recent research, however, indicates that this effect may be less important than has been previously believed. Heterogeneity among firms may insulate established firms from the replacement threat posed by new firms (Bertin, Bresnahan, and Raff 1996). Recessions also affect the rate of new firm creation. By reducing the rate of new firm creation, recessions alleviate the pressure exerted upon established units (Caballero and Hammour 1994). In fact, studies focusing on the relationship between entry and macroeconomic conditions (Highfield and Smiley 1987, Mata 1996) found a stronger correlation than those focusing on exit and survival (Boeri and Bellmann 1995, Ilmakunnas and Topi 1999). The results of these recent studies thus suggest that it is exactly the newest firms that are more likely to suffer in recessions. New firms are more likely to suffer from cash constraints than established ones (Cabral and Mata 2003), as they did not have the time to develop legitimacy in financial markets (Diamond 1989). As cash is typically scarcer during recessions than in prosperity, recessions are likely to affect particularly the newest firms. All of these reasons lead us to hypothesize that

Hypothesis 3C *Unfavorable current macroeconomic conditions decrease the probability of survival.*

The studies mentioned above focused on the effect of current business conditions upon entry and exit. Macroeconomic conditions prevalent at the time of entry may also affect survival. Highfield and Smiley (1987) showed that periods of high firm creation follow periods of relatively depressed conditions. Individuals that are unemployed are known to be more likely to create new firms than those that have a job (Evans and Leighton 1989), but firms created by unemployed also face a higher probability of failure (Pfeiffer and Reize 2000). This suggests that it may be relevant to account for the macroeconomic conditions at the time of entry. If industry conditions can imprint new firms because they are forced to go into niches or use inferior resources, imprinting should apply to the conditions in which new firms are pushed if founded in times of depression.

Hypothesis 3F *Favorable macroeconomic conditions at founding persistently increase the probability of survival.*

FIRM STRATEGIES

With respect to the impact of firm strategies upon survival, ecological and economic arguments offer two rather different views. Ecological arguments stress inertia; emphasizing that selection tends to favor those firms that remain highly immutable (Hannan and Freeman 1984). According to this view, the greater the magnitude of change, the greater the probability of exit. Economic arguments, in contrast, emphasize the adaptive role of change. Confronted with suboptimal positions, firms change – and try to change for the better. Those which are successful survive and prosper. Those which are less successful in setting up new directions and implementing them, wither and exit. For example, Levinthal (1997) emphasizes the ability of firms to adapt to changing environments as being crucial to shape the process of selection and survival; it is not only the magnitude of change that matters, but rather the fit of the performed change that matters the most. While many authors acknowledge that change will be more likely when past performance has not been good (Boeker 1989, Miller and Chen 1994), the outcome of this change upon performance may vary according to the circumstances (Zajac, Kraatz and Bresser 2000).

Firm size

Large firms have been found to experience higher survival probabilities than their smaller counterparts (Dunne, Roberts and Samuelson 1989, Audretsch and Mahmood 1994, Mata and Portugal 1994, Mitchell 1994, Haverman 1995, Sharma and Kesner 1996). There are several reasons why this may be so.

One such reason is that larger firms are more likely to be closer to the minimum efficient scale needed to operate efficiently in a market, and are therefore less likely to be vulnerable than smaller firms that operate further up the cost curve (Audretsch and Mahmood 1994). Large firms may be larger than some small firms, not because the two necessarily want to operate at different scales, but because they have different access to funds (Fazzari, Hubbard and Petersen 1988). Those that experience the greatest cash constraints will, thus, be forced to operate at a smaller scale. Even if this does not push smaller firms into a cost disadvantage via economies of scale, it will put them in a tougher position to survive unexpected temporary difficulties than competitors with better access to funds (Zingales 1998). By the same token, large firms are also typically more diversified than smaller firms, and this may improve their survival prospects by reducing risk and keeping alive options in one market should activities go sour in another. Finally, larger firms may be more efficient, not because they operate at a different point on the cost curve, but because they may have different managerial capabilities. Better capabilities translate into lower costs at any given size and, these lower costs lead firms to choose to operate at a large scale (Lucas 1978). The observed size of firms is thus a consequence of their superior ability. All of these reasons suggest that current size is likely to be related to the survival of firms, and we therefore predict that

Hypothesis 4C *Larger firms have lower probabilities of exit.*

In the standard economic model of the evolution of firms and industries (Jovanovic, 1982), current firm size is the only information that matters for predicting survival. In this model, firms start with no prior knowledge about their efficiency. As time goes by and firms observe their performance in the marketplace, they gradually learn about their efficiency. Those firms that are observed to be successful grow, while those that are less lucky contract. Current size at any given moment incorporates all of the firms' histories and nothing further is required to predict survival. The critical feature that makes initial decisions irrelevant in Jovanovic's model is that all adjustments are instantaneous. Expectations about efficiency are identical at start-up, therefore, all firms start with identical sizes. Expectations are then fully adjusted at every round and the subsequent capacity and production decisions are also fully updated in conformity with these expectations. While these assumptions of the model allow focusing on what is central in the analysis, they are unlikely to hold true in reality.

At inception, firms have different beliefs about their ability to compete, and these beliefs underlie their choice of entry size. Frank (1988) argues that firms that enter at larger scales are those that have more optimistic *ex-ante* expectations of success. Consequently, they are apt to endure poor performance for a longer time. Larger firms will also be able to suffer losses for longer periods than smaller ones, if their initial sizes were determined by the relative severity of cash constraints. Furthermore, while the liquidity constraints argument was initially established with relation to mature firms (Fazzari, Hubbard and Petersen 1988), the impact of cash constraints should be greatest during the earliest ages of firms, when information asymmetries are more severe and firms still were not able to develop a reputation (Diamond 1989). The effect of initial decisions may also persist because strategic decisions frequently involve the deployment of resources that cannot be later reallocated, that is, which are sunk. When investment costs are sunk, there may be little point in reversing a decision, as costs cannot be recovered. Therefore, even if it proves to be clear that a given decision was not a wise one, *ex post* the firm's best option may be to stick with it anyway (Dixit and Pindyck 1994). Finally, even if a firm finds it optimal to adjust, it may be optimal to do it gradually. This may be because when sunk costs are involved, it may be better to wait until the uncertainty is resolved (Cabral 1995), or because the required resources may not be available to the firm in sufficient amounts, a point which was emphasized by Penrose (1959). Writing in the context of the growth of firms, Penrose argued that lack of managerial resources would put limits on the ability of firms to expand and that, once firms are in a given position, it may be difficult to change this position very rapidly. Indeed, firms are observed to converge gradually to their desired size (Bogner, Thomas and McGee 1996).

Even if initial firm size is not at all important once all the adjustments are complete, the fact that firms adjust gradually toward their desired size, makes it relevant to know their departing point as well as their current position. If there are adjustment costs in the process of firm growth, the current size of growing firms will be an underestimate of the firm's desired size. Thus, the fact that a firm has grown in the past signals that it has been performing well, and that it would wish to be larger than it currently is. Consequently, it should have lower exit probabilities than its current size alone indicates (Mata, Portugal and Guimarães 1995). Therefore we predict that

Hypothesis 4F *Firms that had larger initial size have lower persistent probabilities of exit.*

Human capital

If market processes select the most able organizations, the possession of valuable knowledge or skills should improve the chances of firms. The Resource-Based View of the Firm has long stressed that the ability of firms to survive and compete successfully is largely determined by the extent to which firms develop firm-specific assets, that cannot be imitated by competitors and which provide the basis for their competitive advantage (Wernerfelt, 1984, Barney, 1991). Also, recent studies on entry, post-entry penetration, and survival show that the ability to develop and exploit such assets is crucial for the post-entry performance of firms (Burgelman, 1994, Bogner, Thomas and McGee 1996, Chang, 1996). A number of authors have pointed out that human capital, rather than physical capital, provides the basis for sustained competitive advantage (Youndt et al., 1996), as "physical technology, whether it takes the form of machine tools or robotics or complex information management systems, is by itself imitable" (Barney, 1991, p. 110). Indeed, assets that constitute the basis for superior performance cannot be imitable or tradeable, and knowledge assets are one of the few classes of assets that are not tradeable (Teece, 1998). Previous studies found human capital to be a good predictor of survival (Mata and Portugal, 2002, Cooper, Gimeno-Gascon and Woo, 1994, Gimeno et al., 1997).

Hypothesis 5C *Firms employing more skilled labor have lower probabilities of exit.*

What makes human capital difficult to imitate or trade is that the knowledge it embodies is, for the most part, tacit. Tacit knowledge is more difficult to transfer than explicit knowledge, and the higher the qualifications of labor the greater the complexity and tacitness of the knowledge it embodies (Simonin 2004). McEvily and Chakravarthy (2002) found that the more complex and tacit knowledge is, the greater is the protection that it offers to imitation of the firm's major product improvements by their competitors.

Tacit knowledge, on the other hand, is best transferred through rich communication rather than through more explicit media (Nadler at al., 2003) and in contexts in which there exist strong ties between members of the groups (Uzzi, 1997), because strong ties are more likely to be governed by the norms of reciprocity (Argote, McEvily and Reagans, 2003). The transfer of knowledge is, therefore, likely to be hindered in a context in which there is rapid labor turnover, as reported by Hatch and Dyer (2004). They found that firms with high labor turnover significantly underperform their competitors, thus suggesting that it takes time before the accumulated knowledge can be transferred between the firm and the new hires. Burton and Beckman (2007) found that when the first holder of a new functional position in a firm has an atypical working experience, the subsequent holders of these positions experience shorter tenures than would otherwise be expected. They interpreted this finding as evidence of imprinting at the job level, which corroborates the argument that it may be difficult to transfer knowledge within the firm if high labor turnover is observed. All the problems associated with the difficulty of transfer of knowledge are likely to be aggravated if the qualitative composition of labor changes from start-up to the development stages, and if labor becomes significantly more or less skilled.

Another problem with changing the labor skill composition, or with changes in another highly tacit asset for that matter, is that the observed changes may overstate the true change that goes on deeply in the firm. Knowledge in an organization is embedded in its individual members, but also in the organization rules, routines, cultures, structures and technologies (Argote, McEvily and Reagans, 2003), some of which may not change as fast as new members enter and old members exit the firm. Improvement of labor skills may thus not be accompanied by contemporaneous changes at all levels that determine the actual performance, and those rules, routines, cultures, structures and technologies that were created as a consequence of initial human resources decisions may last even if these decisions are changed.

Studies analyzing the impact of initial conditions on subsequent performance have focused mainly on founders (Eisenhardt and Schoonhoven 1990, Cooper, Gimeno-Gascon and Woo 1994, Kimberly 1979, Nelson 2003) and found a persistent influence of founders' characteristics, namely their human capital. The evolution of these characteristics was not accounted for possibly because, in most cases, the characteristics that were analyzed are not amenable to change. Our sample allows us to analyze the impact of the whole stock of human capital in the firm, and we hypothesize that

Hypothesis 5F *Firms that employed more skilled labor at founding have persistent lower probabilities of exit.*

III. THE DATA

The data used in this paper were obtained from an annual survey which has been conducted by the Portuguese Ministry of Employment since 1982. The survey has two characteristics that make it particularly suitable for the analysis of firm entry and survival. First, it covers all firms employing paid labor in Portugal. Second, it has a longitudinal dimension, i.e., firms are identified by a unique number, which allows individual firms to be followed over time. We worked with the original raw data files from 1982 to 1995, which include over 100, 000 firms in each year.

As we have worked directly with raw files, we were able to compute entry and survival measures ourselves. This could be done easily because firms are identified in the survey by numbers, which are assigned sequentially when firms first report to the survey. New firms were identified by comparing firms' identifiers with the highest identification number in the file in the previous year. To avoid the inclusion of false entries, we use information on the admission dates of the workers to exclude firms whose worker with the longest tenure exceeds two years. This enabled us to track 118,114 new firm start-ups during the period 1983-1993. These starting and ending dates were chosen on the basis of the available data. We started in 1983 because our data begin in 1982 and we need to know the largest number in the previous year file. We stopped in 1993 because, as we are interested in measuring lifetime survival, we need to have data on a latter date (but see below).

The time of exit is found by identifying the moment when firms cease to report to the survey. With such a large database, there are inevitably some coding errors in the files. To be on the safe side in identifying exit with such a database, we performed some data editing upon the original data file. In particular, we required that a firm be absent from the file for at least two years in order to be classified as a closure. A temporary exit may occur for a number of reasons other than cessation of activity, a very likely reason being that the survey form was not received in the Ministry of Employment before the date when the recording operations were closed. Accordingly, we edited the status of firms that were temporarily absent from the files for one year. That is, firms that were in the files in years *t-1* and t+1 were considered to be active in year *t* even if they were not actually in the file. The firm's record was amended for that year, employment being imputed as the average of employment in years t-1 and t+1. Therefore, for a closure to be recorded in t-1 a firm has to be absent from the file in t and t+1. For this reason, in our subsequent analysis we use data only until 1993, although our data files go until 1995. Data from 1995 are used only to check the presence of the firm in 1994, and the last year for which we can identify an exit is 1993.

Our data end in 1993 for all firms, irrespective of their starting time, meaning that the maximum potential age that individual firms can reach is different for each cohort. Whereas firms from the 1983 cohort can reach a maximum of eleven years of life, the ones from the 1991 cohort can reach, at most, two years. An obvious consequence of this is that, while the exit rates for the first and second cohorts are estimated using data from the seven years, the survival rates of subsequent cohorts are estimated using fewer years. In particular, our estimates for the exit rate after *ten* years are produced solely with data from the 1983 and 1984 cohorts.

Table 1 shows the number of firms in each cohort and the survival rates in each of the years subsequent to entry. Data constraints (explained below) forced us to exclude the cohort of firms created in 1990. The remaining cohorts display comparable patterns in terms of survival, one third of the total number of firms leaving during the second and third years of life, and only one third remaining active after nine years.

For each firm in our sample, we computed measures of size and a proxy for their stock of human capital. The most serious shortcoming of our database is perhaps that the only reliable measure of the size of firms available is the firms' number of employees (the data were originally designed to collect information on the labor market). Therefore, firm size is measured here by employment (number of workers). To proxy the firm's human capital, we computed the proportion of college graduates among the firm's labor force. For each firm, these variables were computed for every year they appear in the data. Because there is no information available for the workforce for the 1990 survey, human capital variables were interpolated for this year (taking the average value for 1989 and 1991). For firms that were created in 1990, there is no reasonable way of estimating these variables and, consequently, these firms were excluded from our analysis. We also computed the Herfindhal index of concentration and the entry and exit rates, defined as the total number of entrants/exitors divided by the total number of firms in the (5 digit) industry, as proxies for the competitive conditions of the markets in which the firms in our sample operated. Finally, we also use GDP growth to characterize the macreconomic environment at the time of entry and at each moment thereafter. GDP growth is available from official sources (descriptive statistics in Table 2).

All of these variables exhibit a considerable degree of persistence over time (Table 3). Correlations between the values of each independent variable at the time of founding and the same variable later in time are always positive and significant. They are, however, clearly different from one, thus indicating that there is a significant amount of divergence between conditions prevailing at the time of entry and those prevailing at later moments.

IV. THE EMPIRICAL MODEL

We are interested in estimating the probability that firms exit when they reach a certain age. For those firms that have not exited at the end of our period of analysis, we do not have information on how long they are going to last. This is known in the statistical literature as right censoring, as for those firms we know only that they survive longer than the age they had when we cease to observe them. Thus, in our analysis of the survival of new firms, we need to employ a statistical model that is capable of accommodating such incomplete durations. Although a variety of such models exist, we employ a semi-parametric hazard model, because such models enable us to characterize the exit process more rigorously than is possible with the conventional approaches, such as Probit or Logit analysis. In particular, this methodology enables us to study how the exit rates evolve over time and the way in which such rates are affected by both firm and sectoral characteristics, as well as by the macroeconomic environment.

As explained above, our data on the duration of firms come from an annual survey. This means that we know only whether or not a firm is active at the survey dates and, therefore, our measured durations are grouped into yearly intervals. For firms that exited during the survey period, all we know is that their durations are expressed in increments of one-year length. For those that were still operating at the end of the survey period, the relevant information is that their duration exceeded the lower limit of the last observed duration. Such a sampling plan is properly accommodated in the framework of discrete duration models, of which a rigorous exposition can be found in Lancaster (1990).

Thus, the statistical model that we work with is a semi-parametric discrete proportional hazards model, which can be formally represented by

$$(1) \qquad \log h(t|x) = \lambda_t + \beta x, \text{ for } t=1, ..., k ,$$

where the left-hand side variable is simply the logarithm of the hazard rate (that is, the log of the probability that the firm exits at time *t*, given that it survived until *t-1*). The parameters λ_t identify the baseline hazard function providing the (log of) yearly exit rates for a firm whose covariates denoted by the vector *x* assume a zero value. β is, of course, a vector of regression coefficients.

Different specifications of model (1) can be written depending on the beliefs about what causes exit. One of the simplest versions of (1) that is possible to write is a model where *x* is a vector of variables that describe the current idiosyncratic and market conditions facing every firm which operates in the same market, which we will denote by x_t.

$$(2) \qquad \log h(t|x_t) = \lambda_t + \beta x_t,$$

There are, however, two sources of heterogeneity that may cause exit and that need to be considered: current heterogeneity among firms, that is the one which is based on differences that exist in period *t*; and heterogeneity that accrues from differences that existed at the moment when firms were created, that is from conditions prevalent in period $t = 0$. Heterogeneity induced by differences in founding conditions includes those conditions that are cohort specific, i.e. which take a common value for all firms in the same cohort, such as macroeconomic or industry-wide factors and those which are specific to each firm. Using x_0 to denote founding conditions, regardless of whether they are firm or cohort specific, inclusion of these variables generalizes (1) to

(3) $\log h(t|x_t, x_0) = \lambda_t + \beta x_t + \gamma x_0.$

In this equation γ is the set of parameters to be estimated that measure the impact of founding conditions on survival conditional upon the effect that current conditions, x_t, have on survival. If founding effects are not important, then $\gamma = 0$, while if current conditions do not matter, then $\beta = 0$. A useful reparameterization of equation (3) is

(4) $\log h(t|\Delta x_t, x_0) = \lambda_t + \beta\Delta x_t + \theta x_0,$

which expresses the probability of exit as a function of the initial conditions (x_0) and of the changes in these conditions from birth to the current period ($\Delta x_t \equiv x_t - x_0$). Clearly, $\theta \equiv \beta + \gamma$, so the test that $\gamma = 0$ becomes a test that $\theta = \beta$.

Equations (3) and (4) provide a framework in which to assess whether founding conditions matter ("*is* $\gamma \neq 0$*? or is* $\theta \neq \beta$*?*"), but it does not enable us to assess whether the effects of founding conditions are temporary or permanent. To do this, we must extend (4) to allow θ to vary systematically over time. A simple way of achieving this is to express θ as a constant plus a term that is linear in age ($\theta = \eta+\delta t$) (Disney et al., 2003). This yields

(5) $\log h(t|\Delta x_t, x_0) = \lambda_t + \beta\Delta x_t + (\eta+\delta t)\, x_0.$

or, if we make it explicit that this specification implies an interaction term between initial conditions and age

(6) $\log h(t|\Delta x_t , x_0)= \lambda_t + \beta\Delta x_t + \eta x_0 + \delta t x_0$.

With this specification, if $\delta = 0$ equation (6) is identical to equation (4), with $\theta = \eta$, and we conclude that the effect of founding conditions on survival is permanent. If δ turns out to be different from zero, we expect it to be negative, larger values of δ (in absolute value) implying shorter duration of the effects.

One disadvantage of this specification is that, as t grows larger, the sign of one specific effect in x_0 can change, as δt may become greater than η in absolute value. A convenient alternative is to multiply the regression coefficient by power function, $\theta = \sigma\phi^{(t-1)}$, which generalizes (4) to

(7) $\log h(t|\Delta x_t , x_0)= \lambda_t + \beta\Delta x_t + \sigma\phi^{(t-1)}x_0$.

The speed of erosion of the effect of initial conditions is measured in this specification by the parameter ϕ. If $\phi = 1$, equation (7) is identical to equation (4) with $\sigma = \theta$, and we conclude that the effect of founding conditions on survival is permanent. The smaller ϕ is, the faster the erosion of the effects of initial conditions will be. If $\phi = 0$, then the effects of initial conditions disappear almost instantly; i.e. after the founding period, initial conditions do not matter. In contrast, if $\sigma = 0$ initial conditions do not matter at all. Unlike in (6) the effect of founding conditions will gradually approach zero as t increases, but will never change sign, which seems to be a desirable property for our empirical model. We will use specification (7) as our preferred specification for testing the persistence of the effect of founding conditions, using (6) as a robustness check.

To sum up, equation (7) forms the basis of a model of the determinants of survival odds that allows for two drivers of exit: market conditions and firms heterogeneities, measured both at founding and at current time.

V. RESULTS

In this section we present our empirical results. Before presenting and discussing the results, however, let us call the reader’s attention to the fact that all our regressions also include the exit rate in the industry as a control variable. The exit rate in an industry is defined as the number of exitors in year t-1 expressed as a proportion of the total number of active firms in the industry in that year. As the dependent variable in our models is the probability of exit confronted by newly created firms, the exit rate will control for all other industry factors that are not included in the regression and that affect exit.

Table 4 presents our benchmark regression results. The results in Table 4 are based on model (2), relating the exit of firms to current conditions. The estimates (of the βs in the model) show that current values of the five independent variables – firm size, human capital, the entry rate into the firm's industry, the concentration ratio and current GDP growth – are all relevant determinants of survival, in both substantive and statistical senses. Large firms, with more human capital, located in concentrated industries with low entry rates, operating during a period of macroeconomic growth, are more likely to survive. Of these relationships, that associated with concentration is the only one that may cause concern. The results indicate that firms that enter in highly concentrated industries are likely to benefit from a price umbrella established by dominant firms. Without any further qualifications, this would imply that these industries would become less and less concentrated over time, a finding that does not sit well with what is known about the persistence of concentration (Davies and Geroski 1997). Given the nature of our discussion about the effect of concentration, however, the results for this variable are better appreciated in the regressions that follow.

Further results are shown in Table 5. The table shows three sets of regression estimates based on the models (4) to (7). Column (i) shows estimates of (4), which is a model in which both initial and current effects are included (if the estimates of $\theta = \gamma$ in (i), then (4) reduces to the null hypothesis, (2); column (ii) shows estimates of (7), which allows the effects of initial conditions to decay over time. Column (iii) shows estimates of a regression identical to (ii) except that the linear specification is used for the decay parameter (model (6)).

Column (i) shows what happens when initial conditions are added to the equation. In the case of all five variables, the hypothesis that $\theta = \beta$ is rejected, either variable by variable or for all five independent variables taken together. Therefore, it is not reasonable to simplify the regression shown as (i) to the one displayed in Table 4; i.e. there is a clear indication that the null hypothesis that solely current conditions matter is inadequate. Column (ii) shows what happens when θ is allowed to decay over time, and it is clear that one should not simplify the regression shown as (ii) to (i); i.e. the hypothesis that the effect of initial conditions is permanent is soundly rejected. Overall, the hypothesis that the effects are persistent is rejected. The computed chi-squared statistic is 72, well above the critical value for a test with 5 degrees of freedom, with a 5 percent significance level (11.1). The basis for this inference lies largely with the coefficient of concentration, which implies a rapid decay, but also with the effect of initial size. Although the estimate of this effect is fairly close to unity, it is also quite precisely measured, and the t-statistic for the null hypothesis that this effect is permanent is above 4. The corresponding effect for GDP growth is just barely significantly different from one (the t-statistic is 1.67) and the hypotheses that the effect of entry and human capital are permanent cannot be rejected.

ROBUSTNESS

The final three columns of Table 5 give some information about how robust these results are to alternative specifications. The first concern is about our specification of the decay parameter. In column (iii) we report the results of using a linear specification as discussed in equation (6). Remember that, while for the exponential specification the decay parameter would be one in the case of complete persistence, the corresponding value of parameter for total persistence is now zero. Inspection of column (iii) reveals that all the qualitative results remain unchanged. All those coefficients that were previously statistically significant remain significant and the point estimates are pretty much the same, except perhaps in the case of the initial effect of entry. The results for persistence are persistent themselves. The hypothesis of full persistence, previously rejected for college and entry, is still rejected for these two variables. In column (ii) the results indicate that the effect of initial concentration does not persist at all. By construction, the linear specification does not allow one to test the hypothesis of no persistence at all. However, using the parameter estimates in column (iii) one estimates that the sign of the effect of initial concentration reverses before the 4th year of life. The corresponding time to reversion estimates for the other variables are 32, 18, 49, and 11 years for Size, College, Entry and GDP Growth, respectively.

Finally, all our models are estimated with age effects (the λ_ts) to account for the evolution of the hazard rates that accompanies the ageing of firms. For the sake of economy, we do not report these parameters in Table 5. These effects are, however, graphically displayed in Figure 2 for our preferred specification. These estimates, which do not change much from regression to regression, clearly show that the older the firm, the less likely it is to fail. A log-likelihood ratio test on the constancy of the baseline hazard function produces a chi-square statistic of 590. This soundly rejects the null hypothesis, that is, we find evidence of a liability of newness (Stinchcombe 1965, Freeman, Carroll and Hannan 1983). We will come back to this issue below.

VII. DISCUSSION

The learning from the results in column (ii) in Table 5 is fairly straightforward. Firms that are larger in their initial year of founding will survive longer, and this effect is almost permanent (at least for the time span recorded in our data). Furthermore, any subsequent increases in firm size improve their survival prospects. This is consistent with a view that posits that firms adjust their choice of size as a consequence of the observation of performance in past periods (Jovanovic 1982) and it is not consistent with saying that the larger the magnitude of change the lower the prospects of survival (Hannan and Freeman 1989). Adjustments in size are, however, far from being instantaneous, as indicated by the fact that the effect of initial size is almost permanent, thus suggesting that the mechanisms indicated by Hannan and Freeman as reasons for firm inertia may indeed apply.

The impact on firm survival of initial human capital formation also seems to be both important and nearly permanent. In contrast, given the effects of founding human capital, it seems that subsequent changes in human capital add almost nothing to survival prospects. The larger the initial stock of human capital in the firm, the lesser the (permanent) likelihood that the firm will exit, but attempts to increase this stock do not lead to sizeable changes in the likelihood of exit. This is, perhaps, particularly surprising, as firms adjust the qualifications of their human capital quite a lot (correlation of human capital over time is the lowest among all the explanatory variables). Although we do not know the details of how these changes are brought about, they are likely to be the consequence of labor turnover rather than that of training of a constant set of workers. Our results indicate that new hires do not immediately translate their potential into improved odds of survival.

The effect of concentration at the time of entry has a strong negative effect upon the probability of exit. However, the effect vanishes almost totally immediately after entry has occurred and the impact of subsequent changes in market concentration is positive and clearly significant, a result that fits well the “trial by fire” hypothesis.

The coefficients on entry are consistent with the argument that competition and excessive crowding in markets reduce survival prospects. Firms that are born in years when many other firms are also entering their industry are much less likely to survive, and their survival prospects are even lower if subsequent entry rates are high. The effect of the founding entry rate is persistent, the estimate being even greater than one (although not significantly so). The impacts of initial and current entry rates are pretty much the same. This can be seen by noting that when the effect of initial conditions is persistent (ϕ=1 in model 7), as is the case with concentration, the impact of initial conditions given current conditions (γ), can be retrieved from the estimated coefficients (θ and β) as $\gamma = \theta - \beta$. Based on the estimates in column (i) we would have 0.477 (0.688 - 0.211), while based on column (ii) we have 0.577 (0.624 - 0.047).

Finally, firms that are born in a boom seem to have almost permanently high survival rates *ceteris paribus*, and survival rates are higher during times in which the economy is growing rapidly than in those in which the economy is declining. Again, the effects of initial and current conditions are of a comparable magnitude. Indeed, they are -0.026 and -0.020 based on the estimates in column (i) and -0.023 and -0.025 based on those in column (ii).

The results for entry rates and macroeconomic conditions are very similar; both current and initial conditions are relevant, and initial conditions exert a permanent effect upon survival. While these results support the ecological view that initial conditions matter for survival, they seem to indicate that the conditions that affect survival go clearly beyond those that are specifically related to the individual markets in which firms operate.

Figure 1 gives a deeper insight on the issue of persistence, by showing the estimated evolution of the magnitude of the effects of the different covariates over the first 25 years of the firm’s life. We are well aware that we are estimating the impact of the different covariates at ages that we do not observe at all. In doing this exercise, we are assuming that the patterns that we uncovered based on the first ten years of life will persist over time. Should the reader be uncomfortable with this assumption, (s)he is well advised to concentrate on the far left side of the plots. In the four plots (entry is not in the graph, as its effect is estimated to be permanent), one sees that the effects disappear at quite different rates over time. The effect of concentration at founding disappears almost immediately after the founding period. A high proportion of the effect of initial size still persists after a quarter of a century. Although, by construction, the estimated effects never reach zero, it is possible to compute the length of time it takes for each of them to reach one half of the initial effect. Simple calculations reveal that Concentration reaches this level before the second year of life, while Size, College, and GDP Growth reach it before the 21st, 10th and 15th year, respectively.

ESTIMATING THE EFFECT OF INITIAL AND CURRENT CONDITIONS

To get an idea of what exactly our estimated effects mean for hazard rates, we plotted the hazard rates that would be confronted by a firm born in favorable (and unfavorable) conditions in Figure 3. The goal with this exercise is to obtain a weighted measure of the different coefficients, to appraise the combined effect of the whole set of covariates.

To construct the "favorable" scenario, we did the following. We calculated the quartiles of each explanatory variable in our data. For each variable, we computed the hazard rates over time using the first or the third quartile, depending on whether the effect of the variable upon the hazards was positive or negative. That is, the favorable scenario is the estimated hazard for a firm that is larger than the median, employs a more educated labor force, was created in a period of relative prosperity and operates in an industry that is more concentrated and less prone to entry than the median. To construct the "unfavorable" scenario, we proceeded symmetrically, i.e. we calculated the hazard rates for a firm that is relatively small, employs a labor force which is not much educated, was created in a period of recession and operates in an industry that is less concentrated and more prone to entry than the median.

Two different plots were produced and reported in Figure 3. In the first plot we keep current conditions constant and appraise the effect of changes in initial conditions (solid line). This plot reveals that the impact of initial conditions can be quite substantial. In particular, in the less favorable scenario, firms exhibit sizably higher hazard rates than in the most favorable scenario. In the second plot we repeated the exercise, holding initial conditions constant and letting current conditions vary according to the observed variation in the sample (dotted line). Again, we constructed the favorable and unfavorable scenarios following the procedure described above.

This new plot reveals that the impact of changing current conditions is also non-negligible.

This exercise allows one to compare the magnitude of the impact of current and initial conditions upon survival. At birth, current and initial conditions are the same. Accordingly, the two plots are identical for age 1. As firms age, the variability in the hazard rates that can be attributed to founding conditions – measured by the difference between the two dotted lines – as well as the one that can be attributed to current conditions - measured by the difference between the two solid lines – is reduced. Figure 4 displays this information in a direct manner. After the first year, the series for current conditions in Figure 4 is essentially horizontal, while the series for founding conditions is decreasing. This means that the relative weight of founding conditions is at a maximum during the first years of life. However, even after ten years of life, founding conditions have a non-negligible impact upon the variability of hazard rates. Between the eighth and the tenth years, the difference between the hazard rate in the less and the most favorable scenarios are of 6 percentage points for current conditions and 5 percentage points for founding conditions.

It is useful to note that the drivers of the changes in the hazard rates over time are different in the two plots. There is, of course, a common element in both plots, the effect of ageing, as measured by the common baseline hazard function parameters (which, however, does not affect the series in Figure 4). Apart from this, in the first plot the estimated changes in the hazard rates are driven by the estimated decays in the effects of the initial conditions. As these decays are, in general, small, their compounded effect is also relatively small. On the other hand, in the second plot the estimated changes in the hazard rates are driven by the observed changes in the covariates; in this plot firms face different hazard rates because at different points in time they face different conditions.

VIII. CONCLUSIONS

In this paper we explored the issue of whether the conditions into which a firm is born have an effect on its survival chances, which founding conditions matter most, and how long their effects last. We applied a structured set of statistical models to data on more than 118,000 Portuguese firms over the period 1983 - 1993, and uncovered very strong evidence that initial conditions matter. Indeed, it was very easy to reject the hypothesis that only current conditions matter; after taking current conditions into account, founding conditions contribute significantly to explain the variation in survival rates.

We were also able to reject the hypothesis that founding effects are permanent, finding that the effect of initial conditions decreases as time goes by. However, although their effect is not permanent *strictu sensu*, many factors (firm size, human capital, entry rates and GDP growth) seem to have relatively long-lived effects on survival. Indeed, despite the fact that the effect of founding conditions upon survival decreases over time, founding conditions still contribute very significantly to explaining the observed variation in firm survival rates a few years after birth. It is worth mentioning here that we observe our firms for ten years at most. Under these circumstances, "permanent" means something rather less than "forever". At most, what we have observed is that founding effects persist relatively unaltered (except for the concentration effect) through the first 10 years of a new firm's life. How much longer they last is an open question. All of these results point to the conclusion that firms bear scars from the conditions of their birth, possibly for at least 10 years after they are born. Further, our simulations show that these effects are far from negligible and, at least in the first years after founding, the effects associated with founding values of the independent variables are greater than the effects associated with current values.

For policy makers, this is sobering news. It is often possible to affect the current market conditions that a firm operates in, but it is never possible to go back in history and alter the conditions under which it was born. That is, the importance of founding effects means that there are inherent limits to what policy makers can do for young struggling firms. It also suggests that policy makers ought to sharply distinguish between neo-natal and post-natal policies, and perhaps focus rather more of their energy on the former than the latter. For managers, a similar caveat applies. When one is going to set up a new firm, it is important to establish it properly from the beginning. Founding conditions have long-lasting effects upon survival, and subsequent reversal of the initial decisions later on may be insufficient to produce the desired improvement in the probabilities of survival.

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Table 1 - Survival rates

		Survival rates after x years (%)									
Cohort	Firms	1	2	3	4	5	6	7	8	9	10
1983	7829	75	65	56	49	44	40	37	34	32	30
1984	6752	77	63	51	44	41	37	35	32	30	
1985	6594	75	64	57	51	46	42	39	36		
1986	8811	80	70	62	56	52	48	44			
1987	10880	81	71	63	57	52	48				
1988	13356	82	71	63	57	52					
1989	15633	80	70	63	57						
1990											
1991	16161	81	71								
1992	15909	80									

Table 2 - Independent variables:
Descriptive statistics

	Mean	Standard Deviation	Correlations					
			Size	College	Entry rate	Concentration	GDP growth	Exit rate
Size	4.461	9.424	1					
College	0.018	0.098	0.032	1				
Entry rate	0.182	0.064	0.002	0.018	1			
Concentration	0.017	0.060	0.058	0.061	0.233	1		
GDP growth	2.954	2.913	0.043	-0.012	0.22	0.001	1	
Exit rate	0.106	0.034	-0.047	-0.066	0.384	-0.034	-0.07	1

Table - 3 Correlations between the values of the independent variables at founding and at later times

	Size	College	Entry rate	Concentration	Exit rate
1 year	0.810	0.648	0.821	0.776	0.606
2 years	0.680	0.498	0.747	0.643	0.572
3 years	0.548	0.406	0.727	0.602	0.559
4 years	0.550	0.332	0.694	0.572	0.479
5 years	0.523	0.328	0.680	0.549	0.402
6 years	0.487	0.339	0.638	0.541	0.415
7 years	0.449	0.362	0.621	0.557	0.377
8 years	0.430	0.424	0.574	0.521	0.26
9 years	0.483	0.364	0.562	0.553	0.272
10 years	0.513	0.322	0.451	0.536	0.254

Table 4 - Regression results

(N=118110)

Variable	Coef	SE
Size	-0.401	0.006
College	-0.443	0.050
Entry rate	0.397	0.080
Concentration	-0.486	0.069
GDP growth	-0.039	0.002
Exit rate	3.612	0.102
LL	-161063	

Table 5 - Regression results (n=118110)

	(i)		(ii)		(iii)	
Variable	Coef	SE	Coef	SE	Coef	SE
Size						
Initial	-0.334	0.005	-0.352	0.007	-0.351	0.007
Decay			0.965	0.008	0.011	0.002
Change	-0.637	0.009	-0.630	0.009	-0.631	0.009
College						
Initial	-0.481	0.054	-0.516	0.066	-0.513	0.063
Decay			0.922	0.065	0.029	0.024
Change	0.033	0.075	0.067	0.078	0.056	0.077
Entry rate						
Initial	0.624	0.085	0.688	0.051	0.695	0.096
Decay			1.015	0.051	-0.014	0.036
Change	0.047	0.110	0.211	0.121	0.118	0.122
Concentration						
Initial	-0.404	0.071	-0.970	0.096	-0.655	0.083
Decay			0.006	0.192	0.187	0.031
Change	-0.211	0.146	0.117	0.134	0.167	0.159
GDP growth						
Initial	-0.046	0.002	-0.048	0.002	-0.049	0.002
Decay			0.950	0.030	0.005	0.001
Change	-0.026	0.002	-0.023	0.003	-0.019	0.003
Exit rate	3.219	0.105	3.389	0.115	3.285	0.109
LL	-158731		-158689		-158695	

The estimate of the decay in column (iii) follows a linear specification (equation (6) in the main text)

Figure 1: The impact of initial conditions over time

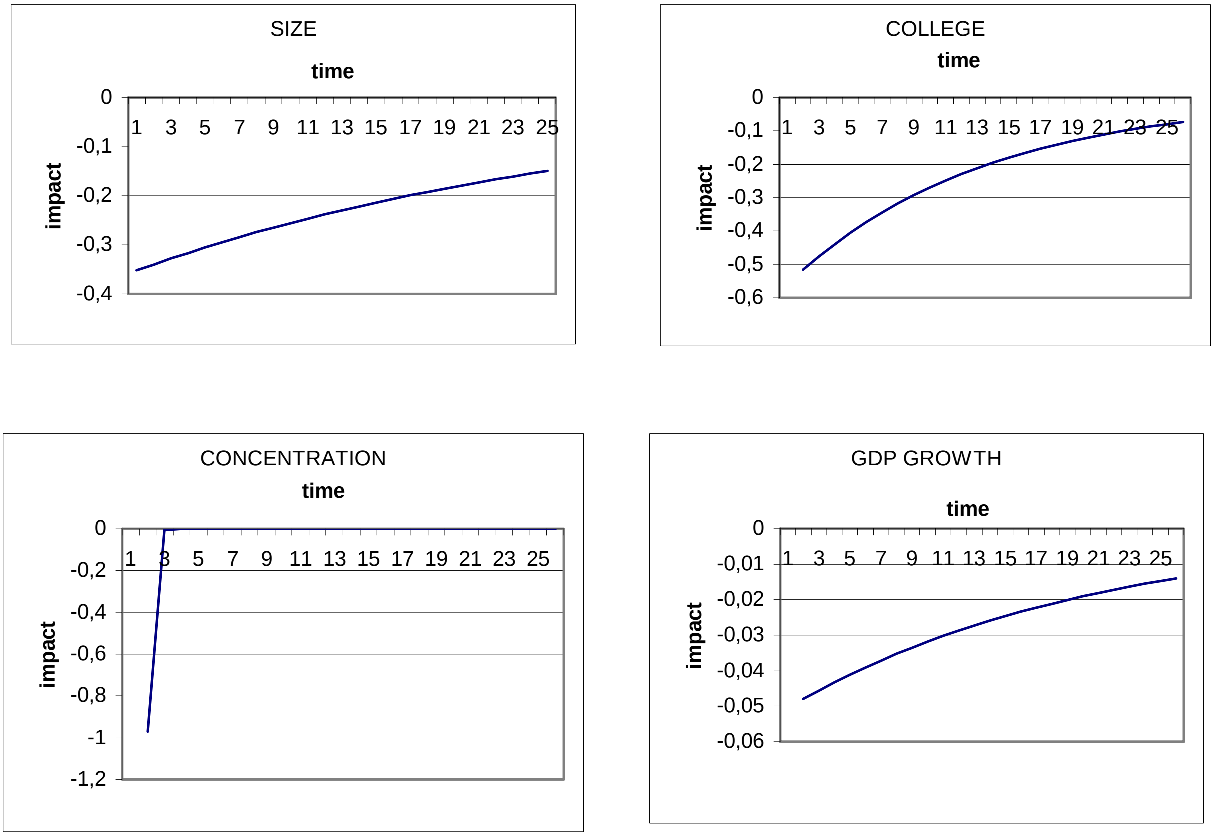

Figure 2: The impact of age upon survival

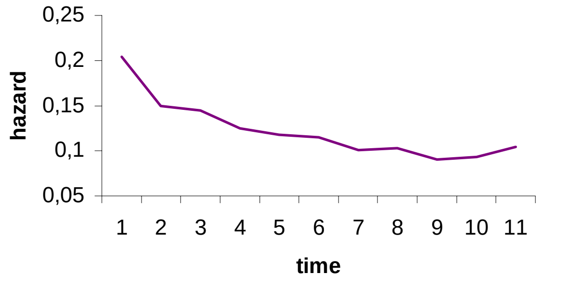

Figure 3: The impact of founding and current conditions upon hazard rates

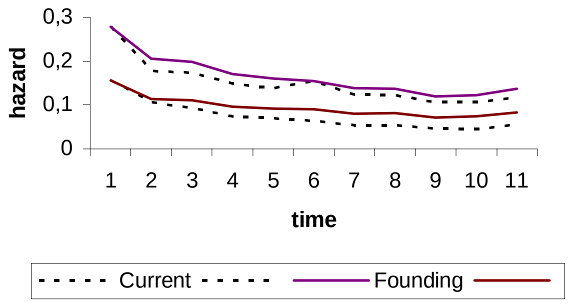

Figure 4: The impact of founding and current conditons upon the variability of survival