# THE SURVIVAL OF FAMILY FIRMS: THE IMPORTANCE OF CONTROL AND FAMILY TIES[1]

by Francesca Lotti[*] and Enrico Santarelli[**]

## Abstract

The aim of this paper is to analyze the survival patterns of a group of *family firms* which have already spent at least twenty-five years in the market. To this end, we use the Kaplan-Meier product limit estimator supplemented with qualitative information gathered by direct observation and discussions with entrepreneurs. The main findings of the paper are that small family firms which have reached their thirtieth year in the market face a very high risk of sudden exit, increasing with firm age. Further control carried out by means of interviews with entrepreneurs identifies problems connected with succession as one of the main causes of the decision to close down.

**Keywords:** Family firms; Succession; Survival function; Kaplan-Meier estimator; Hazard function; Italy.

**JEL Classification:** L20; C34; C41; M13.

**Corresponding author:**
Enrico Santarelli
Department of Economics
University of Bologna
Strada Maggiore, 45
40125 Bologna
ITALY
santarel@spbo.unibo.it

18 December 2002

---

[1] We would like to thank Richard Caves, Matt Gentzkow, Giorgio Gobbi, Paolo Mistrulli, and Alberto Pozzolo for useful suggestions and comments. We thank the participants in the Industrial Organization Workshop at Harvard University (March 2002), the XXIX EARIE Conference (Madrid, September 2002) and in a seminar held at the Bank of Italy. Financial support from Assindustria Rimini and Fondazione Cassa di Risparmio di Rimini is gratefully acknowledged. Alessandra Giraldi provided outstanding research assistance. All remaining errors are our own. The opinions expressed do not necessarily reflect those of the Bank of Italy.

[*] Bank of Italy, Research Department.

[**] University of Bologna, Economics Department.

## 1. Introduction

For entrepreneurs who start a new firm, there sooner or later comes the moment when they decide, or are forced by circumstances, to retire. This decision gives rise to a succession problem which can be solved either by hiring professional managers or by appointing the founder's heirs to run the firm. If a professional manager or a heir is appointed, the founder (principal) can decide whether to stay and monitor him (which he usually does) or to give the agent acting on his behalf an incentive structure which is the same as his own, and thereby engage in delegation (Vickers, 1985). The resulting agent appointment game is more likely to be incentive compatible for the principal when he chooses an agent of his own type, namely a member of his family (who, as a natural consequence of family ties, can be supposed to have an incentive structure the same as his own). This solution to the appointment game is supported by our empirical evidence, which shows that those entrepreneurs who do not have heirs wishing to continue their activity (or do not have heirs at all) prefer to close down their businesses rather than hand over control of the firm they have created to an outsider. As a matter of fact, firms controlled by the entrepreneurs who started them often close down - rather than becoming Berle and Means (1932) corporations - when their founders are about to retire and no viable conditions exist for the persistence of family control after their retirement. According to the above theoretical considerations, succession may affect the likelihood of survival of family firms, even those characterized by the most favorable prospects of success. In-depth analysis of the succession event therefore provides the rationale for supporting the *age dependence* model put forward by Jovanovic (1982) (see also Cooley and Quadrini, 2001) which identifies age as the main dimension of heterogeneity among firms. When succession is considered, i.e. in the case of family firms which have already spent at least twenty-five years in the market, survival can be taken as dependent on age, since entrepreneurial firms experience different dynamics with respect to their managerial counterparts (which, by definition, are not affected by the succession problem) with the passing of time. Following the approach suggested by Borenstein *et al.* (1998), we combine the theoretical considerations put forward in this section with economic

evidence provided by statistical analysis and qualitative information gathered from discussions with entrepreneurs. Accordingly, Section 2 contains an extension of the results presented in Santarelli (2001) which uses the Kaplan-Meier product limit estimator to analyze the relationship between survival and age for a sample of *small* family firms in manufacturing, retailing, and the hospitality sector, the purpose being to identify whether around the thirtieth year in the market, i.e. when the succession problem usually manifests itself, this kind of firm is more likely to exit the market. Section 3 uses direct observation and interviews with entrepreneurs who have already faced or are facing the succession problem to set out the factors affecting their decisions concerning the future of the firm they have created. Finally, some concluding remarks are made in Section 4.

## 2. Data and Econometric Issues

### *2.1 Data*

From the empirical viewpoint, our first step was to study, by means of statistical analysis, the likelihood of survival after the 25$^{th}$ year following start-up of small family firms registered with the Chamber of Commerce of Rimini, in the Emilia-Romagna region of Italy, during the period 1950-1965 and which had survived for at least 25 years. The "family" nature of these firms is confirmed by the fact that they are all single proprietorship firms - which is clear evidence of unlimited liability - and that in 78 per cent of them at least one relative of the owner, besides the owner himself, occupies a crucial managerial position. At the end of 1999 such firms were aged between 34 and 49, and therefore had already faced (or were about to face) the succession event. Their small employment size is confirmed by the fact that at start-up time they had an average of 3.53 employees, whereas the current average size of surviving ones is 7.68 employees[2]. Thus, firms in our analysis satisfy the narrowest family business definition commonly accepted by scholars of family business (Astrachan and Shanker, 1996) which requires direct family involvement in daily operations, more than

[2] At the industry level, average start-up size was 2.9 employees in manufacturing, 2.2 in retailing, and 6.0 in hospitality. In 1999, the average size of survivors was 8.5 employees in manufacturing, 3.7 in retailing, and 8.2 in hospitality.

one family member with significant management responsibility, and multiple generations involved.

Emilia-Romagna is one of the most economically advanced Italian regions and is characterized by the large number of family firms, most of which belong to industrial districts (cf. Forni and Paba, 2002). For these reasons, the Province of Rimini, in the southeastern area of this region, is an ideal observatory for study of the patterns of survival of such firms. We focused our analysis on manufacturing, retailing, and hospitality services, which are still the most important activities in the local economy. The total number of single proprietorship firms registered during the 1950 - 1965 period and still alive after 25 years was 908, most of which (63.10%) were in the retailing sector, whereas manufacturing and hospitality services accounted for respectively 19.94% and 17.95% of the whole sample (Table 1). Nearly two thirds (62.44%) of the initial firms which survived for at least 25 years were still active at the end of 1999; that is, between 9 and 24 years after completion of their $25^{th}$ year in the market. The percentages of survivors are high in all three industries, although hospitality services (70.55%) appeared to perform better than manufacturing and retailing. This is probably connected to the spatial agglomeration of hospitality firms in the Rimini area, which is favored by the endowment of tourist amenities (such as beaches, discotheques, amusement parks, etc.) and is likely to result in a higher likelihood of survival for firms in this industry.

Table 1

**NUMBER OF FIRMS REGISTERED IN THE CHAMBER OF COMMERCE FILES AND ACTIVE FOR AT LEAST 25 YEARS, AND NUMBER OF SURVIVORS IN 1999**

| | Number of firms born in the 1950-'65 period and active for at least 25 years | Percentage | Number of firms still active in 1999 | Percentage of Survivors |
|---|---|---|---|---|
| Manufacturing | 172 | 19.94 | 107 | 62.21 |
| Retailing | 573 | 63.10 | 345 | 60.21 |
| Hospitality | 163 | 17.95 | 115 | 70.55 |
| **Total** | 908 | 100 | 567 | 62.44 |

*2.2 Econometric Issues*

Among many problems concerning survival analysis, it is impossible to make complete measurements of the life spans of all the subjects in the sample. Some individuals, firms in this case, can be dropped from the sample without their having necessarily exited from the market.[3] In the case of business firms, this event may be voluntary liquidation, bankruptcy, or other defined adverse events. Accordingly, for each individual we can observe either the time to *failure* or the time to *loss* (or *censoring*). This means that for the censored individuals, we know only that the time to failure is greater than the censoring time. With these incomplete observations, the estimation of a survival function cannot be a simple description of the sample (Kaplan and Meier, 1958). In the presence of a complete sample one could easily estimate the empirical survivor function via maximum likelihood procedure as:

$$S(t) = \Pr(T > t) = 1 - \Pr(T \leq t) = 1 - F(t) \tag{1}$$

where $T$ is the random variable representing failure time. This survival function gives the population probability of surviving beyond time $t$. Due to the censored nature of our sample, it is not possible to know the exact number of observations with duration greater than $t$. The Kaplan Meier estimator modifies the estimated survival function, keeping the maximum of the available information.

Suppose that we have a sample of $N$ individuals each with a time to failure, or *lifetime*, $T_1, T_2,\ldots, T_N$. If the observations are not complete, we can only have *observed lifetimes*, defined as:

$$t_i = \min(T_i, L_i) \qquad i = 1,2,\ldots, N \tag{2}$$

where $L_i$ represents the *censoring time* (or the limit of observation). These censoring times can be constants or values of other random variables: in any case, they must be independent[4] from $T_i$. In this way, the individuals in the sample are divided into two

[3] Of course, this can be due to several reasons. For instance, an individual can be dropped from a sample if its characteristrics change over time or simply because, at a certain point, the measurement has to be stopped.

[4] Censoring times may differ from individual to individual or they may be the same, also according to the sampling techniques employed.

mutually exclusive classes: deaths (or failures) and losses. Let us partition the age scale into intervals $(0, u_1), (u_1, u_2), \ldots, (u_{k-1}, u_k)$, and then let us denote with $\delta_j$ the number of pure exits and with $\lambda_j$ the number of losses during interval $(u_{j-1}, u_j)$. The relationship between N, $n_j$, $n_j'$, $\lambda_j$, and $\delta_j$ is described in Figure 1 below.

Figure 1

| Number of individuals | N | $n_1$ | $n_1'$ | $n_2$ | $n_2'$ | … |
|---|---|---|---|---|---|---|
| Number of losses ($\lambda_j$) and deaths ($\delta_j$) | $\lambda_0$ | $\delta_1$ | $\lambda_1$ | $\delta_2$ | $\lambda_2$ | |
| Division points of intervals | $u_0$ | | $u_1$ | | $u_2$ | … |

Accordingly, the number of individuals still in life after $u_{j-1}$ is denoted by $n_j$ and $\delta_j$, deaths are observed in the interval $(u_{j-1}, u_j)$, and the estimated conditional probability for interval j is defined as:

$$\hat{p}_j = \frac{n_j - \delta_j}{n_j} = \frac{n_j'}{n_j} \tag{3}$$

Once we take the *k* intervals into account, the Product-Limit estimate (or Kaplan Meier Estimator) is given by:

$$S(t) = \prod_{j=1}^{k} \left( \frac{n_j'}{n_j} \right) \tag{4}$$

The resulting estimator turns out to be consistent for $S(t)$ (Lancaster, 1990).

Another important measure when dealing with survival analysis is the hazard function, or the age-specific failure rate. Let us define first the hazard rate as:

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T < t + \Delta t \mid t \le T)}{\Delta t} = \frac{f(t)}{S(t)} \tag{5}$$

where f(t) is the density function whose c.d.f. is $F(t) = 1 - S(t)$. For each time *t*, the hazard rate λ(t) is the probability of exiting in the period $t + \Delta t$, given that the individual is still alive at time *t*. For our purpose, we use the integrated hazard function, defined as:

$$\Lambda(t) = \int_0^t \lambda(t)dt \tag{6}$$

which can be consistently estimated by means of the Nelson-Aalen estimator (Aalen, 1978 and Nelson, 1972), defined as:

$$H(t) = \sum_{j=1}^{k} \left( \frac{\delta_j}{n_j} \right) \tag{7}$$

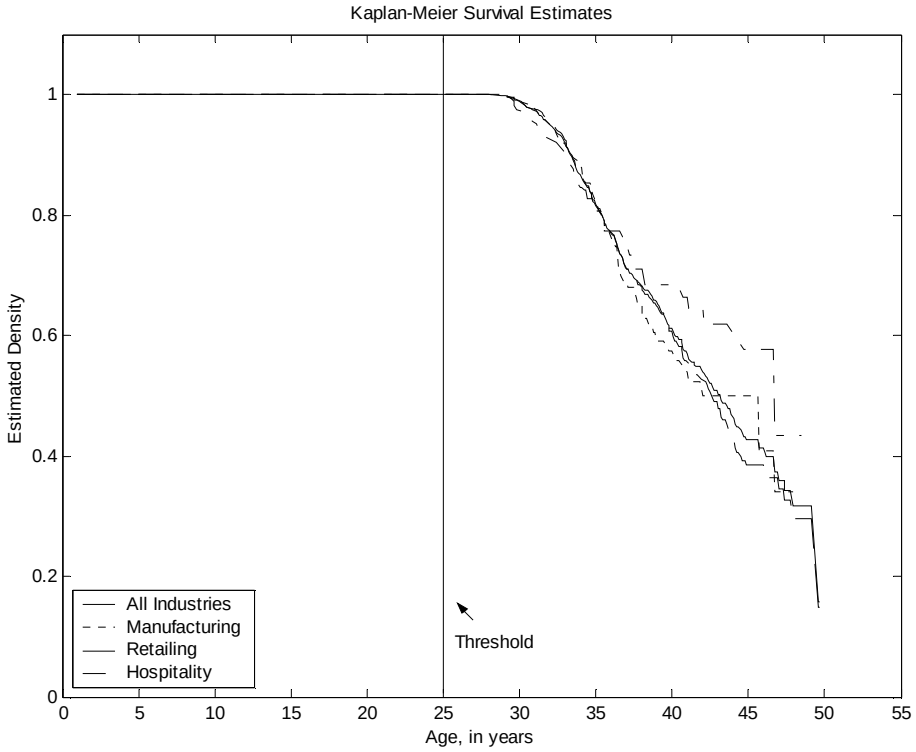
## 3. Results

The Kaplan-Meier estimator applied to the sole proprietorship firms born in the period between 1950 and 1965 and which have survived for at least 25 years in the territory of the Province of Rimini provides a clear picture of the time in the firm's lifetime at which mortality rates have the strongest impact. It should be pointed out that the focus of our analysis is the survival patterns of these firms *just* as a function of their age, independently of the period in which such firms were born. This approach has two main advantages: first, it does not capture any "cohort effect", and second, the impact of the business cycle (if any) is spread over a longer period.

Figure 2 reports the results for all the relevant industries. It will be observed that after about 30 years in the market (i.e. 5 years after the firm's 25$^{th}$ birthday), the likelihood of sudden exit starts to increase dramatically, suggesting the strong dependence of liquidations on the owner's retirement. Both the manufacturing and retailing sectors exhibit patterns of survival which do not differ significantly from those revealed by computation of KM for all industries. In manufacturing, however, the likelihood of exiting the market is much lower after the fortieth year following foundation, and this suggests that the manufacturing firms in our sample may have dealt with the succession event either by hiring professional managers or by leaving the firm in the hands of a direct heir. Conversely, in hospitality services (including hotels, restaurants, and catering firms), the mortality of aging firms starts to be very high just after their thirtieth year of activity, although in the following two decades the likelihood of survival remains higher than in the overall economy.

Figure 2

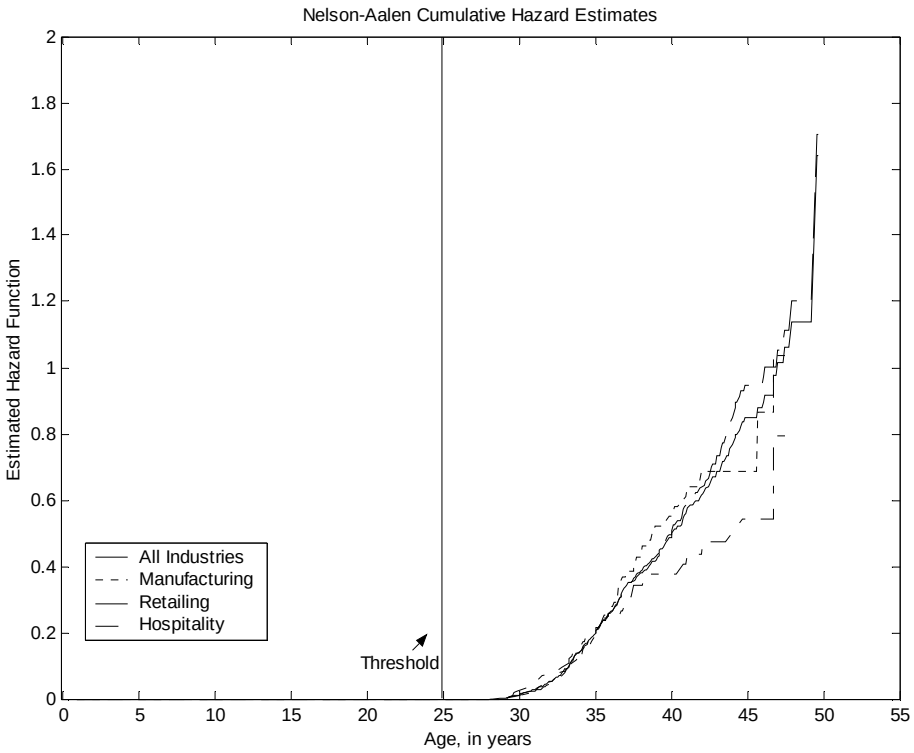
**Kaplan-Meier survival estimates.**




The results from estimation of the integrated hazard function are reported in Figure 3. Inspection of the hazard curves supports the evidence from the KM estimator. The probability of exit, given that the firm is still active in the previous period, tends to increase exponentially with age, after the 30$^{th}$ year in the market. Again, the hospitality industry is an exception, since it shows higher hazard rates between the 30$^{th}$ and the 35$^{th}$ years of age, but thereafter the risk of failure significantly decreases.

Figure 3

**Cumulative hazard function: Nelson-Aalen method.**




This finding confirms that the agglomeration economies which typify the hospitality industry in the Province of Rimini positively affect the persistence of firms in the market, thereby limiting the negative impact of the succession event on the survival of small sole proprietorship firms.

The results from the KM estimator (Figure 2), and those from the analysis of integrated hazard functions (Figure 3), show a common pattern of firm survival and risk of exit across different industries. We also tested statistically the hypothesis of homogeneity of the industry-level survival curves. For this purpose, two tests were performed, the Log Rank test and the Generalized Wilcoxon test; the results are reported in Table 2

Table 2

| **Test** | $\chi^2(2)$ | *Probability* |
|---|---|---|
| Log Rank (LM) | 2.12 | 0.348 |
| Generalized Wilcoxon | 0.28 | 0.871 |

Since neither of the two tests was statistically significant, we cannot reject the hypothesis of homogeneity in the survival patterns, therefore concluding that industry specific factors have not exerted a significant impact on the likelihood of survival of these firms. The likelihood of survival among small family firms is therefore solely a matter of age.

## 4. Qualitative Evidence from Interviews

The quantitative evidence indicates a high risk of sudden exit from the market in the age period during which a firm is more likely to face the problem of succession. We discussed these results with a number of local entrepreneurs whose firms had already faced, or were about to face, the succession event. We interviewed the owners of those firms still active at the end of 1999 by means of a postal questionnaire. Although the response rate was comparable to those of other similar surveys, the results **cannot be generalized,** but they nevertheless provide useful insights into social aspects connected with the problem of succession that cannot otherwise be measured.[5]

Our findings on the higher likelihood of exit when owners/founders are close to retirement met with nearly unanimous agreement among the interviewees, who declared that the family firm is perceived as a social value which should be preserved by transmitting control to the founder's heir. Some of the interviewees regarded as potential "heirs" also key employees who had proved extremely loyal and competent during their service. Besides, it is not unusual for the designated heir to be an employee who has married (one of) the daughter(s) of the entrepreneur. Accordingly, founders find the separation between

[5] In particular, we obtained 61 answers, distributed as follows: 23 in the manufacturing industry, 17 in the retail and 21 in the hospitality industry.

ownership and control entailed by transition to the managerial form difficult to accept, and they prefer to close down the firm when patrilineal descent is not possible and (as the second-best option) none of their employees is willing (or able) to continue the business. In their opinion, the family firm is an organization able to manage effectively most of the various factors - ranging from resource allocation to human relations and from technical mastery to market strategy - which allow realization of a company mission or vision. The family succession in the firm still represents the best way to keep "idiosyncratic knowledge" within the firm (Bjuggren and Sund, 2002). Family ties are a good way to overcome the agency problem that arises at the moment of succession and to avoid transaction costs.

In particular, as far as the "human relations" issue (on which see Uhlaner and Psaurothakis, 1992) is concerned, in a small family firm it is more likely that the employees will satisfy their own needs and wants while simultaneously fulfilling company goals.[6] Many interviewees mentioned the strong bonds tying the founder to his firm, and stressed how in most cases he himself is one of the main obstacles against transfer of the decisional functions to his successors. In particular, in the hospitality industry nearly 90 percent of the retiring founders stated that they had joined their successors in running the firm even after official retirement, and thus continuing to exert *de facto* control over the firm's strategies. This evidence confirms that the founder is reluctant to provide the firm with a managerial structure consisting of professional managers hired externally to the family. In this regard, it is worth noting that only a few entrepreneurs attributed significant importance to attendance at business schools by their heirs: they were in effect convinced that the "art" of running a firm can be only learned through direct involvement in its activity, thereby benefiting from close and constant interaction with the person who created it.

## 5. Conclusions

We can draw some broad conclusions from quantitative and qualitative analysis of how succession affects the likelihood of survival in the case of small family firms. First, the

empirical results are consistent with Jovanovic's (1982) *age dependence* model because they identify age as the main factor affecting the likelihood of survival of sole proprietorship, entrepreneurial firms. Second, the sectoral evidence on the hospitality industry is consistent with the general finding of the literature on locational clusters in Italy that economic agglomeration positively affects the likelihood of survival of small firms. It is likely that in such an environment *a)* the succession process is less dramatic, since the founders' heirs are more willing (and able) to continue running the family business; and *b)* there exists a (local) market in which firms can be more easily sold and bought. In general, our qualitative evidence shows that owners/founders perceive their firm as a "value" which *must* be transmitted to their heirs. From their perspective, appointing professional managers to run the firm implies the substantial failure of an entrepreneurial system based on the strength of family ties. Accordingly, when their heirs are unable to continue the family business, or when there are no heirs, they prefer to close the firm down rather than hand over control to outsiders.

[6] Although this is also connected to the widespread practice of "envelope salaries", which has been shown to be very common in Italian small family firms.

## References


Aalen, O. O., (1978), "Nonparametric Inference for a Family of Count Processes", *Annals of Statistics*, 6, pp.701-726.

Astrachan, J.H. and M.C. Shanker, (1996), "Myths and Realities: Family Businesses' Contribution to the US Economy - A Framework for Assessing Family Business Statistics", *Family Business Review*, 9(2), pp. 107-24.

Borenstein, S., J. Farrell and A. Jaffe, (1998), "Inside the Pin-factory: Empirical Studies Augmented by Manager Interviews", *The Journal of Industrial Economics*, 46(2), pp. 123-24.

Berle, A. and G. Means, (1932), *The Modern Corporation and Private Property*, New York, Macmillan.

Bjuggren, P.O. and L.G. Sund (2002), "A Transaction Cost Rationale for Transition of the Firm within the Family", *Small Business Economics*, 19, pp. 123-133.

Cox, D.R. (1972), "Regression Models and Life Tables", *Journal of the Royal Statistical Society*, B(34), pp. 187-220.

Cooley, T.F. and V. Quadrini, (2001), "Financial Markets and Firm Dynamics", *American Economic Review*, 91(5), pp. 1286-1310.

Forni, M. and S. Paba, (2002), "Spillovers and the Growth of Local Industries", *The Journal of Industrial Economics*, 50(2), pp. 151-71.

Kaplan, E.M. and P. Meier, (1958), "Nonparametric Estimation from Incomplete Observations", *Journal of the American Statistical Association*, 53(3), pp. 457-81.

Jovanovic, B., (1982), "Selection and Evolution of Industry", *Econometrica*, 50(3), pp. 649-70.

Lancaster, T., (1990), *The Econometric Analysis of Transition Data*, Cambridge University Press.

Nelson, W., 1972, "Theory and Applications of Hazard Plotting for Censored Failure Data", *Technometrics*, 14, pp.945-965.

Santarelli, E., (2001), "Ricambio generazionale e continuità dell'impresa", *L'industria*, 22(1), pp. 141-72.

Uhlaner, L. and J. Psaouthakis, (1992), *Managing the Growing Firm*, Englewood Cliffs (NJ), Prentice-Hall.

Vickers, J, (1985); "Delegation and the Theory of the Firm", *The Economic Journal*, Issue Supplement: Conference Papers, 138-47.