The Termination of Joint Ventures

José Mata
Nova School of Business and Economics
Campus de Campolide,
P1099-032 Lisboa,
Portugal,
email: jmata@fe.unl.pt

Pedro Portugal
Banco de Portugal and
Nova School of Business and Economics

September 30, 2013

We are grateful to the audiences in several seminars and conferences for comments and to Lucena Vieira for research assistance. Support from Nova Forum and Fundação para a Ciência e Tecnologia is also acknowledged.
The Termination of Joint Ventures

Abstract

We analyze different modes of terminating international joint ventures, namely closure and acquisition. We find that the antecedents of the joint venture and the contractual arrangements made at its creation affect the likelihood of the venture being terminated by acquisition and the identity of the partner that makes the acquisition. In contrast, the initial decisions regarding asset specificity and the size of the venture affect the likelihood of closure, but not that of acquisition. We use a very flexible statistical methodology that allows accommodating a variety of time patterns, and even the possibility that some joint ventures never confront the chances of terminating under each of the termination modes. We find that the chances of terminating a joint venture first decrease and then increase over time, in particular when the joint venture is terminated by dissolution of the firm or by acquisition by the foreign partner.

Keywords: dissolution, joint ventures, survival
1 Introduction

Many international joint ventures (IJVs) confront high chances of termination (Kogut, 1988; Yan and Zeng, 1999, Das and Teng 2000, Beamish and Lupton 2009, and references therein). Termination can occur in different ways: by dissolving the venture or by having one of the partners fully acquire the venture, and these different modes of dissolution may be prompted by different causes. For example, Kogut (1991) found that unexpected industry growth increases the likelihood of acquisition (by one of the partners), but unexpected fall in industry shipments does not increase likelihood of dissolution. Hennart, Kim, and Zeng (1998) also found that the determinants of termination of JVs explain the selling of JVs, but not their liquidation, while Chang and Singh (1999) found that older firms shut down businesses, but younger firms sell them. Furthermore, they found that businesses that have been entered by acquisition are more likely to be exited by sell-off, a finding which was also reached by Mata and Portugal (2000) in the context of foreign firms. Which partners acquire and which divest the joint venture has received much less attention. A study in which Hennart, Roehl, and Zietlow (1999) used the proportion of the JV being bought by domestic and foreign partners as a test of the hypothesis that joint ventures are used as a ‘Trojan horse’ to acquire knowledge from the other partner remains one the few papers that have examined the issue.

In this paper, we analyze the process of joint venture termination and consider the alternatives by which termination can occur. We distinguish the factors that affect the survival of the business unit and that lead to closure from those that may generate problems in the relationship between partners that may lead to acquisition. In this latter case, we discuss which partner is more likely to make the acquisition. Most of the studies mentioned above discuss a single set of determinants of joint venture termination and report evidence that while one type of termination is affected by the hypothesized forces, the other is not. In contrast, we develop explicit hypotheses for the factors that lead to the different types of termination and are able to identify what leads to each type of termination. We argue that the antecedents and the
arrangements that are made at the outset of the joint venture affect the likelihood of the different modes of termination. Joint ventures that are created from scratch are more likely to be shut down than those that come into being from a partial acquisition of a previously existing firm. Those coming from a partial acquisition have a greater likelihood to terminate by being bought back by the former owner. Disproportionate equity splits are likely to tip the acquisition process toward the majority owner. Closure, on the other hand, is related to the scale and type of investments that are made at the inception of the joint venture.

Our analysis carefully controls for the evolution of joint venture termination over time. Even though some studies have controlled for age in their analysis, to our knowledge, the way the likelihood of termination of IJVs evolves over time has not been thoroughly examined, except for the studies of Park and Russo (1996) and Park and Ungston (1997). The fact that we distinguish between different termination modes exacerbates a problem that is common to all the studies relying on age dependence, that is, the relationship between the probability of an event and age: the evidence that the probability of terminating a joint venture decreases over time can be spurious and arise because the sample includes a proportion of firms that do not confront the risk of termination. We account for this possibility and, indeed, find that there is a non-negligible fraction of joint ventures that may never terminate by dissolution or by foreign acquisition.

2 Modes and determinants of joint venture termination

International joint ventures can be terminated by shutting down their facilities or by continuing operations under the full ownership of either the domestic or foreign partner. These three different outcomes are likely to be governed by different forces and the attributes of the joint ventures are likely to exert disparate impacts upon the probabilities of terminating in different ways.
2.1 The antecedents of the joint venture

While most of the literature implicitly regards joint ventures as new entities created by the partnering firms, the truth is that joint ventures can be created by partial acquisition of equity in an ongoing firm (Chen and Hennart 2004, Chen 2008). A common reason for making a partial acquisition is to mitigate the asymmetric information problem inherent to full-acquisitions (Chen and Hennart 2004, Reuer and Ragozzino 2008). By keeping the former owner with an interest in the firm following the partial acquisition, his incentives to mis-represent the true state of the firm and to engage in non-observable value reducing activities is diminished. Still, the fact that some joint ventures start as greenfield investments while others are created from an already existing firm has implications for the longevity of the joint ventures and for the mode of how these ventures are eventually terminated.

First, to the extent that joint ventures are also subject to the normal risk of doing business, those that have been created from scratch are more likely to be shut down than those that have already been operating for some time. The fact that a firm has been partially acquired is an indication that the acquiring firm saw value in the acquired unit. Those productive units that existed prior to the formation of the joint venture and that were thought to be sufficiently valuable to be kept in operation within the joint venture are likely to already have a minimum level of efficiency that greenfield units do not. As such, these units are less likely to be unviable and are less likely to be terminated by closure. If they are to be terminated, this value makes it likely that the termination will be by passing ownership to a single party, in very much the same way that firms that have been acquired are more likely to be sold off than shut down (Chang and Singh, 1999).

Hypothesis 1) **Joint ventures that were created from an already existing firm are less likely to be shut down than greenfield joint ventures.**

In addition, the fact that a firm has been partially acquired in the past also indicates that its capital has a relatively low degree of specificity. When new joint ventures require highly specific capital stocks, it is unlikely that existing firms are greatly valuable to them. Greenfield entry may be the way to develop
the required tailored production facilities by such ventures. Because of the high degree of specificity, it may be difficult to sell such facilities if the ventures prove unsuccessful. Conversely, those units that have been acquired are likely to have less specific capital (Mata and Portugal, 2000). In much the same way that it was possible to find a buyer in the past, it will likely be possible to find another buyer should the need arise. Consequently, we hypothesize

**Hypothesis 2)** Joint ventures that were created from an already existing firm are more likely to be acquired than greenfield joint ventures.

### 2.2 The acquiring party

To the extent that partial acquisitions are a way of overcoming problems of asymmetric information inherent to full-acquisitions (Chen and Hennart 2004, Reuer and Ragozzino 2008), it is reasonable to expect that the successful development of these acquisitions eventually terminates with the joining party fully acquiring the ownership (Steensma et al. 2007, Puck et al. 2009). Indeed, Zaheer et al. (2010) report that those international acquisitions that were preceded by a form of alliance between the acquired and the acquiring companies show better returns than those that were not preceded by such alliances. When uncertainty is high the asymmetry of information is exacerbated and sequential investment and divestment becomes more likely (Reuer and Shen 2004, Folta and Miller 2002).

However, not all acquisition joint ventures will be successes and develop according to plan. While there is little knowledge about what proportion of joint ventures terminate according to the plan, one of the few studies on this matter (Makino et al. 2007) provides evidence that unanticipated termination is by far dominant with only 10% of the joint ventures being terminated according to what had been planned. Steensma et al. (2007) show that joint ventures in which there is conflict between partners are likely to become fully owned, especially if decision power is markedly unbalanced between partners.
One way of terminating a joint venture that came about through the partial acquisition of an ongoing firm is a full reacquisition by its former full owner (Chi and Seth 2009). When partners of such a joint venture conclude that the match between them is not good, a buyback is an easy way to end the venture, as it amounts to a return to the previous position. It has been argued that this would be a natural route for terminating joint ventures partially acquired by a foreign party as this party would be insufficiently committed to the venture (Hennart et al. 1998, Steensma et al. 2007). This argument extends naturally to any acquiring partner and thus, firms that were previously wholly domestic are more likely to return to their wholly domestic status, while those that were previously fully owned by foreigners are more likely to become wholly owned by foreigners again.

*Hypothesis 3) Joint ventures that were created from an already existing firm are more likely to be bought back by the original owner than to be acquired by the joining party.*

**2.3 Contractual arrangements - Equity share**

Conditions that are relevant for the longevity of joint ventures include the initial contractual arrangements established between partners. Different partners make different contributions to the joint venture and these contributions are reflected in the agreements under which JVs are formed (Blodgett, 1991). Although control of a joint venture cannot be taken to be identical to the distribution of equity among partners, the initial distribution of equity reflects the distribution of bargaining power among partners and control over the firm (Yan and Gray, 1994; Mjoen and Tallman, 1997).

For the joint venture to be stable, the arrangements must be such that all parties are satisfied with them. Uneven distributions of equity may have costs for the stability of the joint venture, because the smaller the share that one partner has in the joint venture, the greater the likelihood that it will behave opportunistically (Inkpen and Currall, 2004), and free-ride on the other partner.

Joint ventures with uneven equity splits have been found to be more prone to termination (Blodgett, 1992), which is likely to occur due to the initiative of the dominant partner to avoid this
opportunistic exploitation. Furthermore, to the extent that large equity shares reflect a partner’s high contribution to the joint venture, a large share in the venture is an indication that the firm may more easily survive without the other party than vice-versa. Therefore, if one partner holds a disproportionately high equity share in the firm, the chances are that it will eventually acquire full control of the firm.

_Hypothesis 4) The greater the share of equity held by one partner, the more likely it is that this partner takes full control of the firm._

### 2.4 Efficiency advantages and asset specificity

The source of efficiency advantages is typically associated with the ability of firms to develop firm-specific assets, that cannot be imitated by competitors and that provide the basis for their competitive advantage (Wernerfelt, 1984; Barney, 1991). Firms with such assets are normally those that conduct R&D activities and spend considerably on advertising. In the context of foreign subsidiaries, Delios and Beamish (2001) found that intangible assets affect the survival of foreign subsidiaries and that R&D expenditures, in particular, affect the survival of joint ventures.

Although activities such as R&D may involve substantial spending on physical facilities and equipment, the ability of firms to use advanced technologies relies heavily on the presence of a highly educated workforce (Autor, Katz, and Krueger, 1998). Indeed, a number of authors have indicated that only human capital, not physical capital, can provide the basis for sustained competitive advantage (Youndt, Snell, Dean Jr, and Lepak, 1996). As Barney (1991, p. 110) puts it, “Physical technology, whether it takes the form of machine tools or robotics or complex information management systems, is by itself imitable”. One of the few classes of assets that are not tradeable today are knowledge assets (Teece, 1998), which puts the ultimate source of competitive advantage of a firm in its employees.

Knowledge assets are hard to imitate because of the complex and tacit nature of knowledge (Polyani, 1966). To the extent that it is tacit, knowledge is not amenable to codification, but is embodied in the organization’s routines and processes (Nelson and Winter, 1982; Coff, 1997; Teece, 1998).
However, as Grant (1996) notes, knowledge exists only in individuals, and an important way of acquiring knowledge and developing the ability to generate new knowledge is through formal education. Although the evidence suggests that a number of managerial decisions, ranging from on the job training programs to human resources selection procedures, can change the stock of human capital in the firm (Snell and Dean Jr, 1992; Youndt, Snell, Dean Jr, and Lepak, 1996), there is also evidence that investments in firm-specific human capital are more productive if the workforce has large endowments of general human capital, of the type provided by formal education (Altonji and Spletzer, 1991). This suggests that schooling may be seen as an indicator of the quality of the land where the seed of human resource management is to blossom. Highly qualified labor indicates a high content of knowledge and tacit and explicit knowledge are complementary (Inkpen and Beamish, 1997). Also, highly qualified labor will be more apt to learn, but tacit knowledge leads to ambiguity and to low levels of knowledge transfer (Simonin, 2004). Asset specificity makes investments less recoverable, closure less profitable and thus less likely. A high degree of asset specificity also makes it harder to find suitable outside buyers for the company.

Hypothesis 5) Joint ventures with a greater human capital endowment experience a lower probability of being terminated by closure.

Hypothesis 6) Joint ventures with a greater human capital endowment experience a lower probability of being terminated by acquisition.

2.5 Firm size

Joint ventures face the same normal business risks as any other firm,. Virtually all studies on firm survival have found that large firms tend to survive more than small ones (Dunne, Roberts and Samuelson, 1989; Audretsch and Mahmood, 1994; Mata and Portugal, 1994; Mitchell, 1994; Haveman, 1995; Sharma and Kesner, 1996). A number of reasons have been suggested to account for this. The first two are related to superior efficiency of large firms. On the one hand, large firms may benefit from
economies of scale thereby boosting efficiency (Audretsch and Mahmood, 1994). On the other hand, size may also be a consequence of superior efficiency. Even if economies of scale are not present, firms with superior managerial capabilities will have lower costs regardless of size and these lower costs encourage firms to operate at a large scale (Lucas, 1978). A third reason is related to constraints in accessing funds (Fazzari, Hubbard and Petersen, 1988). If there are cash constraints, firms for which these are more severe will be forced to operate at a smaller scale. Even if these constraints do not push smaller firms into a cost disadvantage via economies of scale, they make it harder to survive unexpected contingencies in comparison to competitors with easier access to funds (Zingales, 1998). Large firms are also likely to be more diversified than their smaller counterparts and this may reduce risk and improve survival prospects. All of these reasons suggest that size is likely to be related to the closure of firms, not necessarily to the other modes of termination. Therefore, we predict that

_Hypothesis 7_ Larger joint ventures experience a lower probability of being terminated by closure

### 3 Empirical model

#### 3.1 A Statistical Model for Analyzing Exit over Time

For analyzing the time pattern of the longevity of joint ventures, we rely on statistical models belonging to a class known as duration analysis (Lancaster, 1990) or event history analysis (Allison, 1984). Before going into the details of the specification of our empirical model, it is convenient to examine an objection to the analysis of joint venture termination as a stochastic process. The objection relies on the idea that most joint ventures are temporary in nature and terminate when the goal for which they were created in the first place is accomplished. For example, Geringer and Killing (1988, p. 120) assert that “quite a few joint ventures are formed to solve what are, for at least one of the partners, temporary problems”. In their suggestions to managers on how to deal with this issue, the authors
recommend: “Set up the venture on a project basis, with a definite termination date”. Gulati (1998, p. 307) expresses the opinion that “many successful alliances terminate because they are predestined to do so by the parent firms at the very outset” To the extent that this is a pervasive phenomenon in reality, the time patterns of terminations might well be determined by the duration clauses as expressed in the joint-venture contracts. In this case, research attempting to analyze the instability of joint ventures should be directed to the reasons that lead partners to stipulate different durations in their contractual arrangements, and ultimately to the specificity of the projects developed by the joint venture.

However, although many joint venture contracts may indeed have a duration clause, very little is known about the time-pattern of these clauses in different contracts. In one of the few studies that analyze data on duration clauses, Luo (2002) reported an average duration of 24.6 years with a standard deviation of 3.5, which is in sharp contrast with the much shorter durations generally observed in empirical studies on joint venture terminations. These two findings can only be reconciled if no more than a minority of the joint ventures do actually terminate according to the plan. Very little is also known about the extent to which terminations come about as a consequence of the exhaustion of the project that originated the joint venture or as a result of something that was previously unexpected. Makino et al. (2007), who performed one of the few studies on this matter, indicate that the latter is by far dominant, only 10% of the joint ventures terminating according to what had been planned, which suggests that the timing of actual terminations does indeed have an important non-deterministic element, and supports the statistical modeling of the termination of joint ventures. Conventional continuous time duration models are, however, inappropriate in our case, as we observe durations only at year intervals. Instead, we will use a simple discrete time duration model: the complementary log-log (clog-log) model.

Consider time to be divided into $k$ intervals $[\tau_0, \tau_1), [\tau_1, \tau_2), \ldots [\tau_{k-1}, \infty)$. We observe joint ventures at discrete points in time $T \in \{1, \ldots, k\}$ where $T = t$ denotes the termination of a joint venture within the interval $[\tau_{t-1}, \tau_t)$. The hazard function, which gives the probability of terminating the joint venture during interval $t$, given that it was still active at the beginning of this interval, is given by
\[ h(t) = P(T = t | T \geq t), \quad t = 1, 2, \ldots, k - 1 \]

and the survivor function, which gives the probability of staying active up until is defined as

\[ S(t) = P(T \geq t) = \prod_{j=1}^{t} [1 - h(j)] \]

To incorporate the effect of explanatory variables upon survival, we apply the same approach as in the conventional proportional hazards model (Cox, 1972), and define

\[ S(t | x_i) = S_0(t)^{\exp(x'_i \beta)} \]

where \( S(t | x_i) \) is the probability that the individual joint venture \( i \) with covariates \( x_i \) (which measure those of its characteristics that are relevant to survival), will remain active up to time \( t \), and \( S_0(t) \) denotes the baseline survivor function (that is, where the covariates equal zero). Given the relationship between the hazard and the survivor functions above, one can write

\[ 1 - h(t | x_i) = \left[ 1 - h_0(t) \right]^{\exp(x'_i \beta)} \]

which leads to the clog-log hazard function

\[ h(t | x_i) = 1 - \left[ 1 - h_0(t) \right]^{\exp(x'_i \beta)} \]

The baseline hazard function may be parameterized using different functional forms, and the regression coefficients may be interpreted as in standard proportional hazards models. The model can be estimated straightforwardly, by transforming the duration data into binary outcomes, a procedure known as “episode splitting”, and using maximum likelihood methods to fit a generalized linear model with binomial error and complementary log-log link.

In writing the likelihood function, a distinction has to be made between joint ventures that were terminated and those that were run as joint ventures until the end of the survey. To the former, we can
assign discrete durations. To the latter, all we know is that their duration exceeds a given limit, and thus the observations are right censored. This same statistical methodology applies to the three modes of terminating a joint venture and three equations are estimated. In order to separate the determinants of these three different exit modes, a clear distinction has to be made between joint ventures that terminate because the firm is shut down and those which are fully acquired by domestic or foreign owners. When any one of these events occurs, the observation is treated as censored in the other two exit mode equations.

3.2 Age dependence

Age dependence refers to the way the hazard rates evolve over time. If hazard rates increase over time, we say the phenomenon exhibits positive age (or duration) dependence; if hazard rates decrease over time, the phenomenon exhibits negative age dependence; if hazard rates are constant over time, the phenomenon does not exhibit any age dependence at all.

A common approach to the modeling of age dependence is to assume that $h_0(t)$ follows a given distribution. Among continuous time models, popular choices are the Weibull and the lognormal distributions. These were the distributions used by Park and Russo (1996) in their seminal analysis of the age dependence of joint venture termination. There are, however, serious potential drawbacks with an *a priori* use of this approach. Those distributions are not general enough to accommodate sufficiently varied patterns of age dependence, and the choice of an inappropriate distribution to model $h_0(t)$ may seriously endanger our conclusions about the nature of the evolution of the hazard rates over time. In addition, as the most common distributions are not nested with each other, it is not easy to choose between them. These problems are compounded when duration data are grouped into time intervals. As before, if the discrete nature of the duration variable is not taken into account, the estimation procedure will lead to inconsistent regression coefficient estimates and a misleading picture of duration (age) dependence.
In our discrete duration model, \( h_0(t) \) can be easily modeled as a function of age, avoiding the imposition of severe distributional assumptions. We use a rather flexible specification that models the hazard rate as a polynomial function of Age. Estimation proceeds from a first-order polynomial by adding as many higher order terms as necessary. The process stops when higher-order terms are found not to be significant. This allows the hazard function to have as many inflection points as is most appropriate to fit the data well, without the parametric constraint that predetermined distribution functions would impose.

3.3 Spurious negative age dependence and “defective” risks

Negative age dependence may be observed for spurious reasons if the population under analysis contains unobserved (or unknown) heterogeneous groups of firms, each exhibiting different levels of risk. In this case, even if there is no genuine age dependence, that is, even if the risk confronting each firm is constant over time, the observer may conclude that the risk is diminishing over time. This occurs because firms in the group with higher risk will leave the sample more rapidly than do those in the other group. The remaining sample will, therefore, be made up of an increasing proportion of firms with a low risk of exit.

To make these ideas clearer, consider a simple extreme case in which we have 160 firms, in two groups of 80 firms each. One of the groups confronts a constant hazard rate of 50% while the other confronts no risk of exit (0% hazard rate). In the first period, 40 firms from the first group will exit, and an observer will calculate the overall hazard rate to be 25% = 40/160. In the second period, 20 firms (one half of the remaining firms in the first group) will exit again, and the observer will now calculate the hazard rate to be 16.7% = 20/120. Therefore, if the analyst cannot identify the group to which each JV belongs, he runs the risk of concluding for negative age dependence, while this is not warranted by the data. Note that the opposite is not true – one may never be led into the conclusion of positive duration dependence.
3.4 Some JVs may never terminate in one given mode

The above is likely to be a problem in our context as some termination modes may never be considered by some joint ventures. This does not mean that some joint ventures will never terminate at all; only that some will never choose some modes of terminating.

Closure may never be considered by some joint ventures. Utilities are a clear example, but others are possible: producers of goods with low value content per unit of weight or produced in highly specific facilities, such as mineral water, beer, cement, or providers of services for which a highly specific distribution network is important are all unlikely to be shut down. If these firms encounter problems, they may be traded, but actual closure is highly unlikely. This, of course, applies within a foreseeable future. It is highly unlikely that people will stop drinking water, but if a close substitute for cement is discovered that can be produced at much lower cost, it is not impossible that cement plants will eventually disappear. Also, although there may be some industry characteristics that make this more likely, it need not be the case that all firms in a given industry do not shut down. It may be that some firms in that industry consider shutdown as an option while others do not.

Some other firms may never be fully acquired by foreign partners. A first reason is that, in some countries, there may be government restrictions. In other countries, even if it is not legally required, it may be difficult to do business without a local partner. Restriction may apply across the board (e.g., limit of 74% foreign ownership in India) or to a particular industry (e.g. airlines in most OECD countries, Conway, Janod, and Nicoletti, 2005). Even when there are no such restrictions in the law, countries often seek to impede acquisitions of some firms by foreigners. One such attempt occurred with success in April 2007 when, despite the non-existence of any foreign ownership limits on telecommunications in Italy, the Italian Prime Minister Romano Prodi made a call on Italian banks to help stave off the takeover of Telecom Italia by the Mexican America Movil. The Spanish operator Telefonica acquired a minority equity share in the Italian telecom operator, but the government succeeded in achieving its goal of preventing Telecom Italia from becoming foreign controlled. A second reason for some joint ventures
never becoming fully foreign owned is a heavy reliance on geographically distributed resources. Running a highly decentralized distribution network, for example, requires constant monitoring and will be best done by someone based in the country. While this need not be done through a joint venture (other alternative arrangements may be available, e.g., franchising), if an “own distribution” network is preferred, the foreign partner may never consider operating it itself. Typically, the advantage of foreign partners lies elsewhere, and they will not wish to invest resources locally in areas that are not related to their core advantage. The foreign partner may consider finding another domestic partner or, if this is not feasible, divest from the country.

Finally, domestic partners may never consider acquiring some international joint ventures, when the contribution of foreign partners is typically highly specific. Foreign partners must possess some specific assets (normally associated with knowledge of a particular technology, or possession of firm-specific goodwill, in the form of brands, trademarks, etc.) that enable them to compensate for the liability of foreignness. It may thus be impossible for a domestic firm to replace the contribution of the foreign partner, as the knowledge required to eliminate foreign dependency is usually more difficult to acquire than that required to eliminate dependency from local partners (Inkpen and Beamish, 1997).

3.5 Handling terminations that will never occur

To incorporate the possibility of “defective” risks, that is, the possibility that some units may survive forever, we redefine the survival function, which represents the proportion of joint ventures that did not terminate until \( t \) as \( S(t) = (1 - p) + pS(t) \), where \( p \) is the proportion of joint ventures that face a risk of dissolution, that is, which are indeed “susceptible” to the risk of failure. The survival probability is, therefore, given by the proportion of long-term survivors, \( (1 - p) \), which do not exit into a given destination with probability 1, plus the proportion of “susceptible” firms, \( p \), multiplied by their corresponding probability of remaining a joint venture until \( t \), \( S(t) \).
Models of this type have been used with a single risk in the duration analysis of the acquisition of new products (Anscombe, 1961), job stability (Yamaguchi, 1992), deaths by AIDS (Struthers and Farewell, 1989) or criminal recidivism (Schmidt and Witte, 1989). Generalization to multiple independent risks is straightforward (Addison and Portugal, 2003), the maximization of the likelihood function producing estimates for one additional unknown parameter $p$ for each mode of termination. In order to guarantee that each $p$ lies between zero and one, the logit reparameterization for $p = \exp(\mu)/(1 + \exp(\mu))$ was employed. This has no other consequence in terms of finding evidence of long-term survivors, since it does not preclude $p$ from being as close to one (or zero) as needed.

4 Data

The data used in this paper were obtained from an annual survey (Quadros de Pessoal, hereinafter QP) which has been conducted by the Portuguese Ministry of Employment since 1982. Unlike most databases employed in the analysis of alliance and foreign direct investment, our data are not restricted to the largest companies, and include firms of all sizes, as the survey covers all firms employing paid labor in Portugal. We worked with the original raw data files from 1982 to 2002, which include over 100,000 firms in each year.

The survey has two characteristics that make this data set a unique source for analyzing the survival of joint ventures. First, the survey has a longitudinal dimension, i.e., firms are identified by a unique number allowing them to be followed over time. Second, the survey records the share of equity held by non-residents, which we use for identifying joint ventures.

We are concerned here with foreign joint ventures, that is, firms that have a significant (but not total) foreign equity participation. Because of this, we restricted our analysis to those firms having a foreign participation between 10% and 90%. The 10% threshold is usually employed to distinguish foreign direct investment from portfolio investment, as this is the threshold that normally grants the right to designate one board member. Using this criterion, we were able to identify 2234 newly formed joint
ventures, which comprise our sample. An important limitation in the database is that we do not know the identity of the firms’ owners. This is unfortunate because we will not be able to identify the number of partners in the joint venture nor will we be able to identify joint ventures where all partners are foreign companies. Moreover, we will not be able to trace the acquisition of a share held by one foreign firm that is sold to another foreign firm and, similarly, we will not be able to identify the transfer of ownership if both the buyer and the seller are domestic firms.

Our definition of entry involves the creation of a new equity alliance between foreign and domestic partners. These new JVs may be created in three different ways. The first involves the creation of a new legal entity. The second is by having a foreign party acquire a stake in an already existing firm that was until that moment entirely held by domestic owners. The third is by having a domestic partner acquire a stake in an ongoing firm that was previously entirely owned by foreign owners. Symmetrically, we identify three ways in which an equity joint venture may terminate: by shutting down the firm, by being totally acquired by domestic partners or totally acquired by foreign partners.

We were able to identify the longevity of joint ventures because firms are identified in the survey by numbers, which are assigned sequentially when they first report to the survey. The moment in which joint ventures are formed was identified by comparing firms’ identifiers over the years. Greenfield joint ventures, i.e., joint ventures that did not exist as independent legal entities prior to their formation were located by comparing the firm’s number with the highest identification number in the file in the previous year. The creation of joint ventures when such creation came about by acquisition was identified by locating the first year in which a previously existing firm exhibited a percentage of foreign equity between 10% and 90%. Our analysis includes joint ventures that were formed during the period 1983-1999, a period which was chosen on the basis of the available data.

To compute our longevity measures we located the moment when firms exit by searching the files for the first year the firm ceases to report to the survey or the first year the firm’s foreign equity is outside the 10%-90% interval. To be on the safe side in computing life spans with such a large database,
we performed additional controls before classifying the absence of report as a termination. Namely, we required that a firm be absent from the file for at least two years in order to be classified as a closure. For this reason, in our subsequent analysis we use data only until 2000, although our data files go until 2002. Using this methodology we determined the longevity of joint ventures formed during the period 1983-1999 and ceased not later than 2000. For the remaining JVs started during the same period, all we know is that they were still active in 2000, thus making our duration measure right-censored.

4.1 Variables

We use the information in our data set to develop measures for the variables (outlined in Section 3) that account for the survival of firms.

We measure the antecedents of the joint venture with two dummies indicating the firm status prior to becoming a joint venture. One dummy indicates whether the firm was previously wholly foreign owned, while the other indicates whether it was previously wholly owned by domestic owners. The omitted category includes firms which were created simultaneously with the creation of the JV.

We also want to include a measure of the share of equity held by foreigners. While the foreign share can vary on a continuous scale between 0 and 100, earlier studies (e.g. Franko, 1989) typically used categories such as minority, equal stake, majority owned joint ventures to account for partners’ control over joint ventures. More recently, Dhanaraj and Beamish (2004) suggested that equity share should be used to explain survival of international joint ventures rather than these broad categories, and this was the variable used in this work.

We measure the propensity to develop firm-specific assets by computing the share of college graduates among the firm’s labor force. Empirical studies have measured the extent of asset specificity intensity of ownership-specific advantages by using different measures of the educational level of the workforce as proxies for human capital in the firm (Pugel, 1978; Lall, 1980; Mata and Portugal, 2000; Villalonga and McGahan, 2005).
Size was measured here by the logarithm of the number of persons in the firm. Previous evidence on the effect of firm size on the survival of firms suggests a very robust negative effect (Mitchell 1994, Haverman 1995, Sharma and Kesner 1996). The relationship between size and the likelihood of divestiture is less obvious and the empirical studies that have analyzed exit by divestment have not found any significant relationship between divestment and the size of firms (Schary 1991, Mitchell 1994).

In addition we control for the extent of foreign presence in the industry where entry is attempted. The impact of previous presence of foreign firms upon the survival of the new foreign owned firms has been scrutinized in different studies (e.g., Mascarenhas, 1992; Mitchell, Shaver, and Yeung, 1994; Shaver, Mitchell, and Yeung, 1997). Most of the arguments developed in this line of research are of a time-series nature, comparing the positions of first-movers with those of late-movers. In our case, variation is largely cross-sectional. We thus expect previous foreign presence to signal the presence of those characteristics, such as advertising and technological intensity, which make foreign survival more likely. These are characteristics that we are not able to observe directly, but that are also related to the previous presence of foreign firms in the market (Dunning, 1993; Caves, 1996). We include previous foreign presence in the industry as a means of controlling for these unobserved industry characteristics, which may be related to the survival of foreign firms. Foreign presence is measured by the proportion of employment in the industry that is accounted for by foreign firms.

Summary statistics for the independent variables above and correlations between them are presented in Table 1

Insert Table 1

4.2 Patterns of termination of joint ventures

Table 2 displays our estimates of the survival rate of continuation as joint ventures. Although our data cover a span of 18 years, and all the available data are used in the regressions, the table displays the survival rates for the first 13 years only. As age increases, the number of observations becomes smaller.
for two reasons. One reason is that there are joint ventures that terminate. Only 75% of the total number of joint ventures that are formed (2234 in our sample) are able to make it through the following year. The second reason is that not all joint ventures are observed over the same number of years. While those that are formed in 1983 are observed over 18 years, those that are formed in 1993 are observed for only 8 years. These two effects compound to produce smaller samples for older ages, and thus less precise estimates. Consequently, for older ages, the precision of the estimates is lower than for younger ones.

Insert Table 2

To examine the patterns of survival in more detail, Figure 1 displays the observed empirical hazard rates of a joint venture being terminated by closure, by acquisition of the domestic partner and by acquisition of the foreign partner, respectively. The observed patterns of the hazard function are not identical for the three types of exit. It is clear that the hazard function decreases for termination by closure, at least during the first years; it reaches a plateau in which it is more or less constant; and increases markedly in the last years of the observation period. The hazard rates of being acquired by a domestic partner are essentially constant over time, increasing somewhat in the two last years of observation. Finally, the hazard rates of being acquired by the foreign partner drop abruptly from the first to the second year, then rise very slightly for a number of years, and show a sharp increase at the end of the period.

Insert Figure 1

The regressions presented in the next section also allow us to take into account the effects of the determinants of termination upon these hazard rates and the possibility that some joint ventures never terminate in a given mode, as discussed above.

5 Results

Results of our regression analysis are displayed in Tables 3 and 4. Table 3 reports the results of the conventional complementary log-log model, while the results in Table 4 take into account the
possibility that there exists a fraction of joint ventures that does not confront the risk of being terminated via the mode under analysis. For each model, we report a specification with only a linear term on age and one with a quadratic term as well.

Insert Table 3

The results clearly corroborate our first hypothesis. Joint ventures formed from an already existing firm are less likely to be shut down. This holds true regardless of whether the firm was previously domestic or foreign owned, although the effect is somewhat higher for firms that were previously fully owned by foreigners. Firms that were already operating are likely to have value independently of the joint venture and are, therefore, less likely to see their operations discontinued.

Our second hypothesis was also related to the antecedents of the joint venture. It posited that joint ventures formed from firms that existed prior to the creation of the joint venture would be more likely to be acquired. The rationale is that units that were once partially acquired would likely be less specific and therefore more easily sold again. This hypothesis received only partial support. Although three of the four coefficients associated with prior existence are positive, only one is significant.

The results also give partial support to our third hypothesis, which posited that the acquiring partner is the one that leaves the firm more easily if the joint venture is to be dissolved. The coefficient associated with the Formerly Foreign variable in the foreign acquisitions equation is positive, indicating that firms that were once fully owned by foreign owners are more likely to become fully owned by foreigners again. Similarly, firms that were fully owned by domestic owners before the joint venture are more likely to return to full domestic ownership, but in this case the effect is not statistically significant.

Our next set of findings has to do with the ownership arrangements, as reflected in the share equity held by foreign partners. We find that the split of equity between domestic and foreign partners is clearly relevant to the probability of subsequent acquisition by these partners. The greater the share of equity that one partner holds in a joint venture, the more likely it is that this partner eventually becomes
the full owner of the firm. Partners with very small stakes in the firm may tend to free-ride on the dominant partner, and this partner may find it necessary to dissolve the joint venture. In addition, an even split of ownership at the beginning of the joint venture also may reflect disproportionate contributions from both parties to the success of the venture, and the party with the greater involvement may find it easier to put in the extra effort required to fully operate the venture. We also find that foreign equity share is not important to the probability of closure, which seems to indicate that a greater or smaller foreign share does not really increase overall efficiency of the joint venture.

The skills of the labor force were found to affect the closure of joint venture as expected. Joint ventures with high stocks of human capital are likely to be more efficient and therefore less likely to be shut down. In contrast, we did not find any significant effect of human capital endowments upon acquisition by one of the partners. We hypothesized that to the extent that high human capital stocks signal the presence of highly specific assets, firms with such high stocks would be more difficult to be dissolved by acquisition by one of the partners. The evidence, however, does not support this hypothesis. It may be that high human capital also makes the firm more valuable for acquisition and that this effect may compensate the other. The available data do not allow us to go deeper into this issue.

We obtained the same pattern of results for size. There is no evidence, whatsoever, of a relationship between firm size and dissolution by acquisition, but larger firms are less likely to be closed down. The above relationship between size and closure confirms our predictions. Larger firms, being likely to be more efficient and have fewer constraints, are more apt to survive.

Finally, previous foreign presence in the industry is important to all termination modes. This variable has opposite signs in the two acquisition equations. Foreign acquisition is more likely in industries with greater foreign presence, while domestic acquisitions are less likely in these industries. In addition, closures of joint ventures are also less likely in industries with a strong foreign presence. Overall, these results support the idea that industries having a strong foreign presence are those that are more conducive to the survivability of international joint ventures.
Age attracted a negative and significant coefficient in all equations. When we allow for the possibility of a non-monotonic relationship between age and the termination of joint ventures, the evidence is mixed: no such pattern is uncovered for domestic acquisitions: the squared term is positive, but non-significant, and the minimum of the hazard function is estimated to be at the age of 77 years. For closures and foreign acquisitions, the coefficients are positive and significant and the minimum of the hazard rates are estimated to be at the age of 9 years. A cubic term was also attempted (not reported in the table). In the only case where it was marginally significant (foreign acquisitions), the minimum of the hazard rates was estimated to be at the age of 6 with a maximum at the age of 13.

The pattern that we found suggests that the probability of termination decreases and then increases with age. This is in contrast with the findings of Park and Russo (1996), who report that the chances of termination increase and then decrease. They argue for this pattern based on the evidence that the lognormal distribution fitted their data better than did the exponential or the Weibull distributions. While we cannot comment on Park and Russo’s data, it may be the case that this is due to the lack of flexibility of their distributional choice. In fact, when we used these distributions to fit our data, we also found the lognormal to be preferred to the Weibull or the exponential. None of these distributions can, however, account for a pattern where the chances of termination decrease and then increase, as we found in our data. Therefore, there are also methodological gains in using a more flexible specification, as we do. Our methodology did not preclude us from finding the pattern that we did, as would have been the case of the distributions used by Park and Russo (1996). Notwithstanding, the results relative to the other variables remain largely insensitive to the distributions employed to model the age dependence, and none of the qualitative results changes with any of these alternative distributional assumptions.

Insert Table 4

Table 4 reports that results of estimating a model in which we account for the possibility that some joint ventures never terminate in one given mode. The probability that this happens is estimated to be sizable (and around 36%) in the closure and foreign equations, but is estimated to be zero in the
domestic acquisition equation. What could this result mean? One might expect that if a foreign partner is going to divest from the country, there may be plenty of candidates to occupy its position. First, domestic partners will not have to compensate for a liability of foreignness. Second, they may have lower opportunity costs, because they would be less likely to contemplate alternative locations. This means that they may be satisfied by enjoying lower levels of profits than foreign firms would require. Consequently, they may decide to take opportunities that foreign firms would not take. Note that this result also means that none of the joint ventures is sheltered from the overall risk of terminating. The overall probability of never terminating is given by the product of the probabilities that joint ventures never terminate in each mode. As one of the probabilities is zero, the overall probability is zero as well.

Taking into account the possibility that some joint ventures never terminate in one given mode produces larger coefficient estimates, except concerning the effect of time, but does not change the qualitative results. For the domestic acquisition mode of termination, the proportion of joint ventures that never terminate is estimated to be practically zero. As expected, the impact of controlling for the possibility that some joint ventures do not confront the risk of terminating in one particular mode attenuates the negative effect of age. In the complementary log-log model, the coefficient of Age is negative and significant for all the equations (Table 3, columns 1, 3, and 5). Accounting for the possibility of no termination produces age coefficients which are not significant in two of the equations (see Table 4, columns 1 and 5). In the domestic acquisition equation, the probability of no termination is estimated to be zero and no changes are detected, of course, in the age coefficient estimates. Accounting for the possibility of no terminations in the quadratic specification produces changes in the coefficients such that the minimum of the hazard function for closure and foreign acquisition is found at the sixth year rather than at the ninth, as was the case when no such possibility was accounted for. The cubic specification never produces any significant coefficients for the cubic term.
6 Discussion

Our results suggest a complex pattern for the effect of age upon termination of joint ventures. During the first years, the likelihood of termination decreases, but after a number of years (not many, according to our estimates) the likelihood of exit starts to increase. This pattern of the hazards of being closed down is at the odds with the suggestion of Zaheer and Mosakowski (1997) present evidence suggesting that the odds of exit by foreign firms decrease over time and the difference relative to the corresponding pattern of domestic firms attenuates over time. According to their explanation, foreign firms would be more likely to exit during the first years of operation, due to a liability of foreignness, but as experience brings knowledge about local conditions, this initial disadvantage vanishes and exit becomes as likely as that of a comparable domestic firm. On the contrary, our results for international joint ventures is more consistent with a view of footloose multinationals (Gorg and Strobl, 2003). Foreign firms may enter a country to exploit an opportunity that is limited in time — or will stay in the country as long as an alternative does not emerge that is more interesting. Gorg and Strobl (2003) have found that foreign firms are more likely to exit the country than comparable domestically owned firms. The same findings are reported by Mata and Freitas (2012) who, furthermore indicate that foreign firms become more and more likely to exit over time. Our observation that foreign firms exit the country with probabilities that increase over time is closer to the view of the footloose multinationals than to that of a diminishing liability of foreignness.

The findings for the acquisitions by the domestic partners are in sharp contrast with those for the other modes of termination. Domestic partners mainly acquire firms in which they have a dominant equity share and those which are in industries where foreign firms are not predominant. Over time, the probability of a joint venture being terminated by acquisitions by domestic partners remains at the same level, or even decreases. On the contrary, after an initial period in which the chances of acquisition decrease, foreign partners will fully acquire the joint ventures with increasing probability.
The observed pattern for foreign acquisition fits well the view of joint ventures as options to expand in those cases where the foreign owner would want to do so (Kogut 1991). However, Buckley and Casson (1998) argued persuasively that the domestic partner may also be a ready buyer in those cases where the foreign firm decides to divest. The option value of joint ventures would reside in the possibility of acquiring information about market prospects for some time before making the subsequent decision on whether to acquire or divest (Kumar 2005). As formulated by Buckley and Casson (1998), the theory of joint ventures as bilateral options does not necessarily assign asymmetrical positions to partners in the process of joint venture termination. Our evidence, however, suggests an important asymmetry between the acquisitions and divestments by foreign partners, which involves a rather more passive role for domestic than for foreign partners. Foreign partners will never consider acquiring some joint ventures. In those cases where they do, however, they do so with increasing probabilities over time. Yet, the probability of fully acquiring the joint venture is low as compared to the probabilities of dissolving it.

The two combined findings indicate that foreign partners will exit the country with an increasing probability over time. On the contrary, domestic partners will not exclude fully acquiring any of the joint ventures they take part in, but they will not become more active in seeking to do it (or in successfully doing it) over time. Taken together with the observation that multinationals may be footloose, it is tempting to speculate that domestic partners take full control of the joint ventures when, and if, foreign partners are no longer interested in taking part in them. These different patterns for the evolution of the probability of joint ventures being terminated by the acquisition of one or the other partner is consistent with the idea that the assets of the domestic partner are easier to learn than the assets of the foreign partner (Inkpen and Beamish, 1997). Foreign partners may learn from domestic ones what they need for operating a wholly-owned business, but there is no evidence that domestic partners easily do the same.
7 Conclusion

This paper reports the results of a detailed investigation into the patterns of joint venture termination. We distinguish between three modes of terminating a joint venture and adopt a very flexible specification for the effect of age upon the chances of termination, which allows us to shed light on a number of previously uncovered facts.

First, different modes of termination are determined by different factors. While closures are associated with factors that have been identified as determinants of firm exits in general (size, intangible assets, and previous existence to the formation of the joint venture), acquisition by one of the partners is related to the original equity split between the partners and, in the case of acquisition by the foreign partner, to a previous foreign ownership of the firm. Previous foreign presence was shown to be related to all modes of termination: favoring acquisitions by foreign partners and decreasing the odds of acquisition by the domestic partner or closure of the firm.

Second, the temporal patterns of exit are complex and also differ, depending on the termination mode. The odds of a joint venture being acquired by a domestic partner are fairly constant over time. In contrast, after a short period, the chances of a joint venture being shut down or being acquired by a foreign partner increase. However, there is also a non-negligible share of the total number of joint ventures that will never be shut down or acquired by a foreign partner. On the contrary, all firms confront the risk of becoming fully domestically owned. Not surprisingly, the age increasing pattern of the probability that a joint venture is acquired or shut down is more clearly shown when controlling for this possibility. This possibility is not visible in the data for domestic acquisitions.

For terminations by closure and by foreign acquisition, we find that the odds of termination decrease over time but, following a period estimated to be between five and six years, increase. This is at odds with the findings of Park and Russo (1996) and Park and Ungston (1997), who report exactly the
opposite pattern. The difference is possibly due to a less restrictive methodology than those employed by
the authors above; using their methodology we would reach the same conclusion they did.

Overall, our findings indicate that the likelihood of joint venture termination decreases and then
increases over time, which is consistent with the view that joint ventures have an option value and that
partners use the first years of the joint venture to learn about its prospects. When joint ventures terminate
by acquisition by one of the partners, the evidence indicates that this is much more likely to occur via the
acquisition by foreign partners than by domestic ones. This suggests that domestic and foreign partners
are not symmetrical and corroborates the notion that learning from the other partner is easier for foreign
rather than for domestic partners.

Our results are of particular significance for managers on three grounds. First, starting a joint
venture from an already exiting venture that was previously operating under full ownership of one of the
partners may be a less risky strategy than starting it from a specifically created one, as the latter are more
likely to be shut down than the former.

Second, managers whose companies are considering forming a joint venture in which equity is
very unevenly split may need to be prepared to divest or to fully acquire the venture. If acquisition is
envisaged, this may require the establishment of backup plans to run the company without partners. If it
is divestment that is a likely outcome, it may be sensible to establish *ex ante* contractual provisions or
bargaining positions that allows the exiting party to benefit from the divestment.

Third, managers of the domestic partners should be prepared to see their participation in the
International joint ventures terminate, and should expect it to be more and more likely as time goes by, as
termination both due to closure and foreign partner acquisition is more and more likely over time after
the first five or six years.
References


Table 1: Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity share</td>
<td>0.51</td>
<td>0.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formerly Domestic</td>
<td>0.43</td>
<td>0.50</td>
<td>-0.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formerly Foreign</td>
<td>0.05</td>
<td>0.23</td>
<td>0.14</td>
<td>-0.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College Graduates</td>
<td>0.14</td>
<td>0.23</td>
<td>-0.10</td>
<td>-0.10</td>
<td>-0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign Presence</td>
<td>0.15</td>
<td>0.17</td>
<td>-0.10</td>
<td>0.05</td>
<td>0.03</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>2.65</td>
<td>1.64</td>
<td>-0.13</td>
<td>0.36</td>
<td>0.11</td>
<td>-0.23</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Table 2: Survival rate as joint ventures

<table>
<thead>
<tr>
<th>Age</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival (%)</td>
<td>75</td>
<td>60</td>
<td>48</td>
<td>41</td>
<td>34</td>
<td>28</td>
<td>24</td>
<td>21</td>
<td>18</td>
<td>16</td>
<td>13</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>
Table 3: Regression Results - clog-log model

<table>
<thead>
<tr>
<th></th>
<th>Closure</th>
<th>Domestic Acquisition</th>
<th>Foreign Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Formerly Domestic</td>
<td>-0.290&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.287&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>0.090</td>
<td>0.090</td>
<td>0.090</td>
</tr>
<tr>
<td>Formerly Foreign</td>
<td>-0.566&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.568&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>0.277</td>
<td>0.227</td>
<td>0.200</td>
</tr>
<tr>
<td>Equity Share</td>
<td>-0.072</td>
<td>-0.677</td>
<td>-1.053&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>0.193</td>
<td>0.193</td>
<td>0.201</td>
</tr>
<tr>
<td>College graduates</td>
<td>-0.319&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-0.311&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-0.007</td>
</tr>
<tr>
<td></td>
<td>0.163</td>
<td>0.164</td>
<td>0.182</td>
</tr>
<tr>
<td>Size</td>
<td>-0.201&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.199&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>0.030</td>
<td>0.030</td>
<td>0.028</td>
</tr>
<tr>
<td>Foreign Presence</td>
<td>-0.577&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.573&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-0.522&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>0.278</td>
<td>0.278</td>
<td>0.259</td>
</tr>
<tr>
<td>Age</td>
<td>-0.092&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-0.215&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.038&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>0.017</td>
<td>0.041</td>
<td>0.015</td>
</tr>
<tr>
<td>Age&lt;sup&gt;2&lt;/sup&gt;</td>
<td>0.012&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>0.003</td>
<td>0.004</td>
<td>0.005</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.500&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-1.312&lt;sup&gt;a&lt;/sup&gt;</td>
<td>-2.037&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>0.145</td>
<td>0.155</td>
<td>0.151</td>
</tr>
<tr>
<td>Log L</td>
<td>-2311.7</td>
<td>-2306.7</td>
<td>-2241.2</td>
</tr>
<tr>
<td></td>
<td>9171</td>
<td>9171</td>
<td>9171</td>
</tr>
<tr>
<td>Observations</td>
<td>9171</td>
<td>9171</td>
<td>9171</td>
</tr>
<tr>
<td>Zero Outcomes</td>
<td>8505</td>
<td>8554</td>
<td>8893</td>
</tr>
<tr>
<td>Non-zero Outcomes</td>
<td>666</td>
<td>617</td>
<td>278</td>
</tr>
</tbody>
</table>
Table 4: Regression Results - clog-log model with defective risks

<table>
<thead>
<tr>
<th></th>
<th>Closure</th>
<th>Domestic Acquisition</th>
<th>Foreign Acquisition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Formerly Domestic</td>
<td>0.386$^a$</td>
<td>-0.375$^a$</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>0.107</td>
<td>0.106</td>
<td>0.090</td>
</tr>
<tr>
<td>Formerly Foreign</td>
<td>-0.727$^a$</td>
<td>-0.733$^a$</td>
<td>-0.005</td>
</tr>
<tr>
<td></td>
<td>0.247</td>
<td>0.247</td>
<td>0.200</td>
</tr>
<tr>
<td>Equity Share</td>
<td>-0.116</td>
<td>-0.117</td>
<td>-1.053$^a$</td>
</tr>
<tr>
<td></td>
<td>0.235</td>
<td>0.234</td>
<td>0.201</td>
</tr>
<tr>
<td>College graduates</td>
<td>-0.436$^b$</td>
<td>-0.415$^b$</td>
<td>-0.007</td>
</tr>
<tr>
<td></td>
<td>0.198</td>
<td>0.196</td>
<td>0.182</td>
</tr>
<tr>
<td>Size</td>
<td>-0.252$^a$</td>
<td>-0.247$^a$</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>0.036</td>
<td>0.035</td>
<td>0.028</td>
</tr>
<tr>
<td>Foreign Presence</td>
<td>-0.662$^b$</td>
<td>-0.674$^b$</td>
<td>-0.522$^b$</td>
</tr>
<tr>
<td></td>
<td>0.329</td>
<td>0.329</td>
<td>0.259</td>
</tr>
<tr>
<td>Age</td>
<td>-0.013</td>
<td>-0.150$^a$</td>
<td>-0.033$^b$</td>
</tr>
<tr>
<td></td>
<td>0.024</td>
<td>0.050</td>
<td>0.015</td>
</tr>
<tr>
<td>Age$^2$</td>
<td>0.014$^a$</td>
<td>0.000</td>
<td>0.005</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.900$^a$</td>
<td>-0.713$^a$</td>
<td>-2.017$^a$</td>
</tr>
<tr>
<td></td>
<td>0.188</td>
<td>0.193</td>
<td>0.151</td>
</tr>
<tr>
<td>Prob. Never Fail</td>
<td>0.359$^a$</td>
<td>0.357$^a$</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>0.044</td>
<td>0.042</td>
<td>0.001</td>
</tr>
<tr>
<td>Log L</td>
<td>-2305.1</td>
<td>-2300.3</td>
<td>-2241.2</td>
</tr>
<tr>
<td></td>
<td>9171</td>
<td>9171</td>
<td>9171</td>
</tr>
<tr>
<td>Observations</td>
<td>9171</td>
<td>9171</td>
<td>9171</td>
</tr>
<tr>
<td>Zero Outcomes</td>
<td>8505</td>
<td>8554</td>
<td>8893</td>
</tr>
<tr>
<td>Non-zero Outcomes</td>
<td>666</td>
<td>617</td>
<td>278</td>
</tr>
</tbody>
</table>

- $^a$ Indicates significance at the 0.05 level.
- $^b$ Indicates significance at the 0.10 level.
Figure 1: Hazard rates

Hazard Rate

0.11
0.09
0.07
0.05
0.03
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Age

Closure

Acquisition by domestic partner

Acquisition by foreign partner