The Instability of Joint Ventures: Learning from Others or Learning to Work with Others*

José Mata

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

Pedro Portugal

Banco de Portugal and

Universidade Nova de Lisboa

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Abstract

We analyze the patterns of international joint venture termination, to compare the learning and trust views of joint ventures. We distinguish between three ways in which termination may occur and allow for the possibility that some joint ventures never confront the chances of terminating in these ways. We find that the chances of terminating a joint venture increase over time, in particular when the joint venture is terminated by dissolution of the firm and by acquisition by the foreign partner. Our findings thus support the view that learning outperforms trust in explaining the time patterns of joint venture survival.

1 Introduction

A large number of studies report that international joint ventures (IJVs) are unstable (see Kogut, 1988; Yan and Zeng, 1999, for ample evidence). Although other definitions of instability have been proposed, most studies equate instability to a short lifespan. But what determines the longevity of IJVs and how do the chances of survival evolve over time? One view contends that, as the cooperative venture ages, firms learn about the other party's assets, up to a point when the benefits of joint ventures are offset by their costs and the likelihood of joint venture termination increases. Consistent with this view, Hennart (1991) found that Japanese subsidiaries in the U.S. are less likely to be joint ventures, the greater the age of the subsidiary. An alternative view maintains that repeated interaction over time brings trust to the relationship (Gulati, 1998; Inkpen and Currall, 2004), which should enhance its prospects. According to this view, the more two partners interact, the more they know and trust each other and the better they can cooperate. As they cooperate better, the odds of maintaining the relationship increase.

Despite the obvious implications, the hypothesis that the likelihood of termination of IJVs evolves over time has not, to our knowledge, been tested, although some studies have controlled for age in their analysis. In this paper, we report the results of a detailed investigation into the temporal patterns of the likelihood of joint venture termination. We follow the whole set of international joint ventures formed in Portugal during the 1980s and 1990s and document the evolution of their likelihood of termination. We use these data to test the conflicting hypotheses that emerge from the theories that see the development of joint ventures as a process that leads to an attempt to learn from others, associated with an opportunistic view of joint ventures, in contrast to others that see it as a process of learning to work with others that permeates the scholarly view in the area of trust. This paper seeks to discriminate between these two views, by analyzing the time profile of the evolution of the termination rate, a concept known in statistical methodology as age dependence.

We also take into account that the termination of a joint venture may occur in different ways, namely by dissolving the venture or by full acquisition of the venture by one of the partners, and discuss the possibility that these forms have different determinants. We are not the first to acknowledge the existence of these different modes of terminating a joint venture, nor to hypothesize that these modes may have different determinants. Kogut

(1991) found that unexpected industry growth increases 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 selloff, a finding which was also reached by Mata and Portugal (2000) in the context of foreign firms. Very little work has gone into identifying which partners have acquired and which have divested the joint venture, an exception being a paper by Hennart, Roehl, and Zietlow (1999). These authors 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. We integrate the analysis of these different termination modes in the context of the analysis of the temporal evolution of the likelihood of exit, and are able to document results that have been previously uncovered.

The fact that we distinguish between different termination modes exacerbates a problem which is common to all the studies that rely on age dependence as evidence of theories of the time profile of a given phenomenon: the evidence that the probability of terminating a joint venture decreases over time (negative age dependence) can be spurious. It may occur, not because there is a genuine decrease in the likelihood of termination confronting each firm, but rather because the sample includes, say, two types of firms, each one confronting a risk of termination that is constant over time but different among groups. Indeed, we argue that some joint ventures may never terminate in one given mode, thus confronting a zero hazard rate. Our empirical methodology accounts for this possibility and we find that there is, indeed, a nonnegligible fraction of joint ventures that may never terminate by dissolution or by foreign acquisition. On the contrary, all firms confront the risk of becoming fully domestic owned. We also find that the odds of becoming fully domestic owned are roughly constant over time, but that this is not the case for terminations by closure and by foreign acquisition. For these modes of terminating a joint venture, we find that the odds of termination decrease over time but, after a period which we estimate to be between five and six years, increase. These findings, therefore, support the view of international joint ventures as learning ventures, rather than alliances in which trust building compensates for

the liabilities of private interests.

A caveat is in order at this point. We do not know the identity of the partners involved in the joint venture. This prevents us from distinguishing the sell off of a foreign owned equity to a different foreign partner, or the sell off of domestic equity to a different domestic partner. In this sense, our measures are lower bounds to the extent to which joint ventures are terminated.

The paper is organized as follows. The next section discusses the reasons that may lead to increasing and decreasing stability of joint ventures over time. Section 3 discusses the different modes of terminating a joint venture and the determinants of these modes. In section 4, the implications of this discussion for the empirical analysis of terminations of joint ventures will be presented. Section 5 discusses the data that we use in the analysis and gives an overview of the basic patterns found in these data. Section 6 presents the results and section 7 discusses the implications of these results for our views on the instability of joint ventures. Finally, section 8 concludes the paper.

2 The stability and instability of joint ventures

2.1 Learning from partners and the instability of joint ventures

A major explanation in the literature for the reasons why joint ventures are short lived derives from the transaction costs theory of joint ventures. This theory contends that joint ventures are a response to failures in markets for particular assets held by different companies (Hennart, 1988). Good examples of such assets in the context of multinational investment are tacit knowledge about technology from the potential foreign investor and about the host country from the local partner. The market failure emerges because local firms find it difficult to acquire knowledge about the unspecified details of the technology and foreign firms find it difficult to buy knowledge about the modus operandi of local markets. It thus becomes cheaper for the parties to share both assets through a common endeavor than to trade them through the market. On the other hand, joint ventures also have costs. By making both parties residual claimants on firm's profits, they create in both parties incentives to freeride. This is one factor that makes these ventures highly unstable. Whenever the benefits of joint ventures change, the delicate balance that keeps joint

ventures together may break. The possibility of an early termination is often acknowledged in the joint venture contract itself, by including clauses that give one partner the option to acquire or divest (Chi, 2000).

As partners repeatedly interact as the cooperative venture ages, they may learn about the other party's assets (Kogut, 1988), and a learning intent is sometimes seen as a primary driving force of joint ventures (Hamel, 1991; Khanna, Gulati, and Nohria, 1998; Kale, Singh, and Perlmutter, 2000). Such a learning intent has been found to be particularly relevant at the earliest stages of the alliance (Tsang, 2002), but learning may also occur as a more innocent byproduct of collaboration. No matter what the original intent was, if learning occurs, the costs of joint ventures may outweigh their benefits and the other party becomes expendable (Inkpen and Beamish, 1997). This view fits well the findings of Hennart (1991), that Japanese subsidiaries in the U.S. are less likely to be joint ventures, the greater the age of the subsidiary.

In the context of the international joint ventures, learning can occur as local partners acquire the assets possessed by foreign partners (Lane, Salk, and Lyles, 2001; Lyles and Salk, 1996) or as foreign partners acquire local knowledge (Tsang, 2002; Inkpen and Beamish, 1997). The evidence so far does not unequivocally show that some partners are trying to learn the other party's secrets while the other is trying to conceal them from the former. On the contrary, Lane, Salk, and Lyles (2001) found that effectiveness in assimilating foreign partner knowledge is highly related to previous knowledge between partners and to the willingness of foreign partners to train their local associate (see also Steensma, Tihanyi, Lyles, and Dhanaraj, 2005). And, while Inkpen and Beamish (1997) explicitly stated that the Japanese control of the marketing functions in AmericanJapanese joint ventures located in the U.S. might be a device to enable them to learn about local conditions and reduce the dependence on their local partners, the results of Hennart, Roehl, and Zietlow (1999) question this view. They tested whether the proportion of acquisitions by foreign and locals was different in these joint ventures and concluded that it was not.

Because learning occurs as time goes by, our formulation of the 'opportunistic' view of joint ventures posits that

Hypothesis 1) As joint ventures age, they become more likely to terminate.

2.2 Trust among partners and the stability of joint ventures

Some joint ventures last a long time, and trust among partners is often cited as a key to their extended longevity. The general idea around the theme of trust and its impact upon the stability of joint ventures is that trust intensifies over time (Gulati, 1998). As time evolves and partners get better acquainted with each other, they will trust each other more and require fewer formal contractual arrangements to organize transactions. Trust develops as partners' expectations that the venture is going to continue increase, and it impacts positively on the performance of international partnerships (Aulakh, Kotabe, and Sahay, 1996), which in turn adds incentive to keep the joint venture going (Yan, 1998).

High levels of trust may even lead to increased willingness to provide access to proprietary information and thus create the basis for others to learn about the partner (Inkpen and Currall, 2004). Relationships of trust have been found to allow partners to be selective with respect to the type of knowledge they share or protect, enhancing the possibilities of achieving two seemingly contradictory goals. Kale, Singh, and Perlmutter (2000) found that at the same time that trust enhances learning from partners, it also eases the task of protecting the core knowledge that partners wish to keep proprietary.

Inkpen and Currall (2004) suggest that the process of developing trust among partners may be the basis of a complex and nonmonotonic relationship between age and the hazard rates of joint ventures. They suggest that after a honeymoon period immediately following the formation of joint venture, a critical period may follow, in which the levels of trust are low and the hazard rate increases significantly. Joint ventures that manage to survive that stage will be able to develop trust and hazard rates will decrease.

If trust is the key determinant of the stability of joint ventures over time, we should observe that

Hypothesis 2) As joint ventures age, they become less likely to terminate.

3 Modes of terminating a joint venture

There are different ways of terminating a joint venture. The venture can be dissolved by shutting down its facilities, or it may continue operating under full control of one of the previous partners. In the case of international joint ventures, it can continue under full domestic or foreign ownership, depending on which partner sells and which one acquires equity in the firm. These three different outcomes are likely to be governed by different forces and some given attributes of the joint ventures are likely to exert disparate impacts upon the probabilities of terminating in different ways.

3.1 Determinants of joint venture termination

3.1.1 Equity share

Conditions that are relevant for the longevity of joint ventures include the initial contractual arrangements established between partners. Different partners have 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 freeride on the other partner.

Joint ventures with uneven equity splits have been found to be more likely to be terminated (Blodgett, 1992). Termination, in these cases, 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 with them. 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 3) The greater the share of equity held by one partner, the more ikely it is that this partner takes full control of the firm.

3.1.2 Antecedents of the joint venture

Joint ventures can be formed either by creating a new firm or by having a new partner acquire a share in an ongoing firm. These antecedents are likely to affect the termination rates and the mode by which joint ventures are terminated.

Joint ventures are subject to the normal risk of doing business as much as any other firm. Joint ventures which have been created from scratch are more likely to be dissolved than those that have been created by partially taking over an existing firm, very much in the same way that firms that have once been acquired are more likely to be sold off than shut down (Chang and Singh, 1999; Mata and Portugal, 2000).

Indeed, the fact that the firm was already in operation indicates that it has had a longer time to develop goodwill and reputation, and thus will be less likely to be dissolved. Also, the fact that a firm has been partially acquired in the past indicates that its capital is not highly specific, as it was possible to find a buyer in the market. It should thus indicate that a compatible buyer is more likely to be found if the joint venture is to be terminated.

When the joint venture has been initiated by partially acquiring an ongoing firm, it is very likely that termination may occur via reacquisition by its former full owner. After concluding that the joint venture is not a good match between the partners, a buyback would amount to returning to the previous position. 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 4a) Joint ventures that were created from an already existing firm are more likely to be acquired and less likely to be shut down than greenfield joint ventures.

Hypothesis 4b) Joint ventures that were created from an already existing firm are more likely to be bought back by the original partner than to be acquired by the joining party.

3.1.3 Ownership advantages and asset specificity

Ownership advantages are typically associated with the ability of firms to develop firm-specific assets, which cannot be imitated by competitors and 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 be codified, 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 firmspecific 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).

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

3.2 Some terminations may never occur

Some termination modes may never be considered by some joint ventures. If faced with likely termination, they will always choose an alternative mode of terminating. Note that we are not saying that some joint venture will never terminate at all; only that some will never choose some modes of terminating.

3.2.1 Closures

For some firms, closure is not an option: utilities are an obvious example, but others would be possible: producers of goods with low value content per unit of weight or produced in highly specific facilities, such as mineral water, beer or cement, or providers of services for which a highly specific distribution network is important. If these firms encounter problems, they may be traded, but shut down is highly unlikely.

When we say that they will not be shut down, we mean, at least within the 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 costs, it is not impossible that

cement plants will eventually fade away. 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 shut down as an option while others do not.

3.2.2 Acquisition by foreign partners

Some firms may never be fully acquired by foreign partners. A first reason for this to be so 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 limits in the law, countries often try to impede acquisitions of some firms by foreigners. One such attempt occurred with success in April 2007 when, despite the nonexistence 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 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 rests 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.

3.2.3 Acquisition by domestic partners

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 firmspecific 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).

4 Empirical implications of these views

4.1 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 of models known as duration analysis (Lancaster, 1990) or event history analysis (Allison, 1984). The conventional continuous time duration models are not appropriate in our case, as we observe durations only at year intervals. Instead, we will use a simple discrete time duration model: the complementary loglog (cloglog) model.

Consider time to be divided into *k* intervals $[\tau_0, \tau_1)$, $[\tau_1, \tau_2)$ . . . $[\tau_{k-1}, \infty)$. We observe joint ventures at discrete points in time $T \in \{1,...,k\}$ 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

$$h(t) = P(T = t \mid T \geq t), \qquad t = 1,2,...k-1$$

and the survivor function, which gives the probability of staying active up until tis 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

$$S(t \mid x_i) = S_0(t)^{\exp(x_i'\beta)}$$

where $S(t \mid x_i)$ 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

$$1 - h(t \mid x_i) = [1 - h_0(t)]^{\exp(x_i'\beta)}$$

which leads to the cloglog hazard function

$$h(t \mid x_i) = 1 - [1 - h_0(t)]^{\exp(x_i'\beta)}$$

The baseline hazard function may be parameterized using different functional forms, and the regression coeffcients 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 loglog 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.

4.2 Age dependence

We are particularly interested in 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, popular choices being the Weibull and the lognormal. There are serious potential drawbacks with an a priori use of this approach. First, 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 and, 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 is 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 inconsitent regression coefficients and a misleading picture of duration (age) dependence.

In our discrete duration model, $h_0(t)$ can be easily modelled as function of age, avoiding the imposition of severe distributional assumptions, a rather flexible specification being one 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 any parametric constraint as it would occur with predetermined distribution functions.

4.3 Consequences of some JVs never terminating in a given mode

Age dependence, as explained above, refers to the pattern of evolution of the hazard rates over time. Negative age dependence may, however, be observed for spurious reasons if the population under analysis contains unobserved (or unkown) 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 lower and lower over time. This will occur 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 increasingly 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 calculate the hazard rate to be now 16.7% = 20/120. Therefore, if the analyst cannot identify the group to which each JV belongs to, he runs the risk of concluding for negative age dependence, that is for a "trust" explanation for the time pattern of exit, while this is not warranted given the data. Note that the opposite is not true – one may never be led into the conclusion of positive duration dependence.

4.4 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 $\tilde{S}(t) = (1-p) + pS(t)$, 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 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 longterm survivors, since it does not preclude p from being as close to one (or zero) as needed.

5 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 which 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 which allows firms to be followed over time. Second, the survey records the share of equity held by nonresidents, 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 selling of a domestic position 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. Finally, the third is by having a domestic partner acquire a stake in an ongoing firm which 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 or 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 firms' number with the highest identification number in the file in the previous year. The creation of joint ventures when such creation was 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.

5.1 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.

5.1.1 Equity share

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 that these broad categories, and this was the variable used in this work.

5.1.2 Antecedents

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.

5.1.3 Ownership advantages and asset specificity

We measure the propensity to develop firmspecific assets by computing the share of college graduates among the firm's labor force. The conventional measurement of human capital relies on different measures of the educational levels of the individuals (Mincer, 1974), college being a threshold sometimes employed (e.g. Phan and Lee, 1995).

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).

5.2 Control variables

5.2.1 Size

Firm size was included as a control variable because, everything else being equal, firms which are larger have incurred the sunk costs which are normally greater than the corresponding costs incurred by small firms. Therefore, ex post small entrants should be more likely to exit than large ones (Sharma and Kesner 1996). 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).

Size was measured here by the logarithm of the number of persons in the firm.

5.2.2 Foreign presence

We also 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 under scrutiny 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, our 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 which we are not able to observe directly, but which 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.

5.3 Summary statistics

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

Insert Table 1

5.4 Continuation and termination of joint ventures

Insert Table 2

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 which 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.

To examine the patterns of survival in more detail, Figure 1 displays the observed hazards 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 are not identical for the three types of exit. It clearly 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 hazards of being acquired by a domestic partner are pretty much constant over time, increasing somewhat at the two last years of observation. Finally, the hazards 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 dramatic increase at the end of the period.

Insert Figure 1

The regressions presented in the next section will 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 previously.

6 Results

Results of our regression analysis are displayed in Table 3. For each mode of terminating a joint venture, four equations are reported. The first two are the conventional complementary loglog model while the third and fourth take into account the possibility that there might exist a fraction of the population of joint ventures that does not confront the risk of being terminated under the mode in 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 indicate that the determinants of the different modes of terminating a joint venture are, indeed, different. Both size and the proportion of college graduates have a negative impact on the probability that the joint venture is terminated by closure. In contrast, size and college graduates are irrelevant to the probability of being acquired by the domestic or foreign partners.

Closures are associated with being a greenfield entry: if the firm existed previously to the formation of the joint venture, the risk of the joint venture being terminating by the closure of the firm is significantly reduced compared to when it was previously wholly owned by either domestic or foreign owners. Previous ownership is irrelevant to domestic acquisitions, but foreign acquisitions are more likely if the firm had been previously owned by foreigners.

Equity share is not relevant to the probability of closure, but it is relevant to the probability of acquisition both by foreign and domestic partners. The likelihood of being fully acquired is higher the greater it is the share of the partner in the joint venture.

Previous foreign presence in the industry is important to all termination modes. Again, 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. Closures of joint ventures are less likely in industries with a strong foreign presence. Overall, these results support the idea that industries which have a strong foreign presence are those that are more conducive to the survivability of international joint ventures.

The probability that some joint ventures never terminate in one given mode is estimated to be positive (and around 36%) in the closure and foreign equations, but it is estimated to be zero in the domestic acquisition equation. What could this result mean? One might think 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, which 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.

When we allow for the possibility of a nonmonotonic 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 nonsignificant, and the minimum of the hazard rates is estimated to be at the age of 77 years. For closures and foreign acquisitions, the coeffcients are positive and marginally significant. The minima of the hazard rates are estimated to be at the age of 9 and 8 years, respectively. 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.

Taking into account the possibility that some joint ventures never terminate in one given mode produces larger coeffcients, except concerning the effect of time. For the domestic acquisition mode of termination, the proportion of joint ventures that never terminate is estimated to be practically zero and the model resorts to the complementary loglog.

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 loglog model, the coeffcient of Age is negative and significant for all the equations (columns 1, 5, and 9). Controlling for the possibility of no termination produces coeffcients which are not significant (column 11), or are only marginally significant (column 3). When the quadratic specification is considered, the impact of accounting for the possibility of no terminations is to decrease the positive coeffcient of Age and increase the magnitude and significance of the negative coeffcient of Age squared. Based on these coeffcients, the age after which the hazard rate starts increasing is estimated to be at 5 and 6 years in the closure and foreign acquisition equations, respectively. The cubic specification never produces any significant coeffcients for the cubic term.

7 Discussion

Overall, our results suggest a complex pattern for the effect of age upon termination of joint ventures. During the first years, the likelihood of termination seems to decrease, thus suggesting support for a trust view of the relationship. After a number of years (not many, according to our estimates) the likelihood of exit starts increasing, thus supporting an 'opportunistic' view of joint venture.

The results for the acquisitions by the domestic partners are in sharp contrast with those for the other modes of termination, but they are all consistent and conform well with our expectations. Domestic partners acquire mainly 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. 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 can do the same.

The pattern of the time evolution of the hazards of being closed down is consistent with a view of footloose multinationals (Gorg and Strobl, 2003). Foreign firms may enter a country to exploit an opportunity which 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 will be more likely to exit the country than comparable domestically owned firms. On the contrary, Zaheer and Mosakowski (1997) present evidence suggesting that this difference in exit attenuates over time. According to their explanation, foreign firms would be more likely to exit in the first years of operation, due to a liability of foreignness, but as experience brings knowledge about local conditions, this initial disadvantage would vanish and exit would become as likely as that of a comparable domestic firm. If anything, the evidence reported by Mata and Portugal (2002) indicates an opposite pattern. After a few years with similar exit probabilities, foreign firms become

more likely to exit than domestic ones, although the difference is not statistically significant. Our observation that foreign firms will exit the country with probabilities that increase over time is not strictly incompatible with the evidence presented in any of these studies. It seems, however, closer to the view of the footloose multinationals than with that of diminishing liability of foreignness.

Another interesting suggestion that was made in the literature is that joint ventures may be options held by foreign partners. In the original formulation of this hypothesis, Kogut (1991) viewed joint ventures as options to expand in case the foreign owner would need to do so. Buckley and Casson (1998) argue 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 might lie in the possibility of acquiring information about market prospects for some time and then decide on whether to acquire or divest. They stress that during this relatively short interim period, it is important to develop trust among partners, and one might be tempted to speculate that this suggestion would be supported by our evidence, as we find a relatively short period in which the probability of exit decreases, followed by a period in which it increases. However, this hypothesis would imply a symmetrical pattern for the acquisitions and divestments by foreign partners, which we definitely do not find in our data.

The important asymmetry between domestic and foreign partners that we find suggests a rather more passive role for domestic than for foreign partners. Foreign partners will never consider acquiring some joint ventures. In those cases that 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 the joint venture. The two combined results 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.

8 Conclusion

This paper reports the results of a detailed investigation into the time pattern of joint ventures termination. By distinguishing between three modes of terminating and by adopting a very flexible specification for the effect of age upon the chances of termination, we were able to shed light into 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 pretty much constant over time. In contrast, after a short honeymoon period, the chances of a joint venture being shut down or being acquired by a foreign partner increase. However, there is also a nonnegligible share of the total number of joint ventures that will never be shut down or acquired by a foreign partner. 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.

Overall, our results indicate that the likelihood of joint venture termination increases over time. Our evidence indicates that this is much more likely to occur via the acquisition by foreign partners than by domestic ones and supports the notion that learning from the other partner is an important determinant of the longevity of joint ventures.

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Table 1: Descriptive Statistics.

Variable		Mean	Std. Dev.	Correlations (1)	(2)	(3)	(4)	(5)
Equity Share	(1)	0.51	0.21					
Formerly Domestic	(2)	0.43	0.50	-0.13				
Formerly Foreign	(3)	0.05	0.23	0.14	-0.21			
College Graduates	(4)	0.14	0.23	-0.10	-0.10	-0.05		
Foreign Presence	(5)	0.15	0.17	-0.10	0.05	0.03	0.04	
Size	(6)	2.65	1.64	-0.13	0.36	0.11	-0.23	0.24

Table 2: Survival rate as joint ventures.

Age	1	2	3	4	5	6	7	8	9	10	11	12	13
Survival (%)	75	60	48	41	34	28	24	21	18	16	13	10	8

Table 1: Regression results.

				Closure			Domestic Acquisition				Foreign Acquisition	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Equity Share	-0.072	-0.677	-0.116	-0.117	-1.053^a	-1.053^a	-1.053^a	-1.053^a	1.315^a	1.333^a	1.438^a	1.511^a
	0.193	0.193	0.235	0.234	0.201	0.201	0.201	0.201	0.301	0.302	0.340	0.342
Formerly Domestic	-0.290^a	-0.287^a	-0.386^a	-0.375^a	0.040	0.040	0.040	0.040	0.059	0.064	0.088	0.092
	0.090	0.090	0.107	0.106	0.090	0.090	0.090	0.090	0.156	0.156	0.164	0.165
Formerly Foreign	-0.566^b	-0.568^a	-0.727^a	-0.733^a	-0.005	-0.005	-0.005	-0.005	2.035^a	2.023^a	2.929^a	2.886^a
	0.227	0.227	0.247	0.247	0.200	0.200	0.200	0.200	0.161	0.161	0.188	0.189
College Graduates	-0.319^c	-0.311^c	-0.436^b	-0.415^b	-0.007	-0.007	-0.007	-0.007	-0.314	-0.298	-0.374	-0.355
	0.163	0.164	0.198	0.196	0.182	0.182	0.182	0.182	0.313	0.313	0.255	0.356
Foreign Presence	-0.577^b	-0.573^c	-0.662^b	-0.674^b	-0.522^b	-0.522^b	-0.522^b	-0.522^b	0.613^c	0.618^c	0.936^b	0.937^b
	0.278	0.278	0.329	0.329	0.259	0.259	0.259	0.259	0.330	0.332	0.372	0.373
Size	-0.201^a	-0.199^a	-0.252^a	-0.247^a	0.021	0.021	0.021	0.021	0.021	0.025	-0.008	-0.001
	0.030	0.030	0.036	0.035	0.028	0.028	0.028	0.028	0.041	0.041	0.043	0.044
Age	-0.092^a	-0.215^a	-0.013	-0.150^a	-0.033^b	-0.035	-0.033^b	-0.035	-0.088^a	-0.260^a	-0.015	-0.162^a
	0.017	0.041	0.024	0.050	0.015	0.045	0.015	0.045	0.025	0.060	0.026	0.063
Age^2		0.012^a		0.014^a		0.000		0.000		0.016^a		0.014^b
		0.003		0.005		0.004		0.004		0.005		0.005
constant	-1.500^a	-1.312^a	-0.900^a	-0.713^a	-2.037^a	-2.021^a	-2.017^a	-2.017^a	-4.359^a	-4.105^a	-4.186	-4.007^a
	0.145	0.155	0.188	0.193	0.151	0.166	0.151	0.166	0.246	0.258	0.280	0.289
Prob. Never Fail			0.359^a	0.357^a			0.000	0.000			0.358^a	0.359^a
			0.044	0.042			0.001	0.003			0.043	0.043
Log L	-2311.7	-2306.7	-2305.1	-2300.3	-2241.2	-2241.2	-2241.2	-2241.2	-1115.9	-1113.2	-1088.8	-1085.8
Observations				9171				9171				9171
Zero Outcomes				8505				8554				8893
Non-zero outcomes				666				617				278

Note: For each variable, asymptotic standard errors are presented below the coefficients. Letters a, b, and c indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Figure 1: Hazard rates