Growth paths and exit routes:
'Shadow of Death' effects for new firms in Japan

Contenido

ABSTRACT:
Research has recently emphasized that the non-survival of entrepreneurs can be disaggregated into distinct exit routes such as acquisition, voluntary closure and failure. Firm performance is an alleged determinant of exit route. However, there is a lack of evidence linking exit routes to their previous growth performance. We contribute to this gap by analysing a cohort of incorporated firms in Japan, and find some puzzles for the standard view. In the Japanese context, not all exit routes are available to all firms: small firms do not realistically face the options of acquisition or bankruptcy, but essentially face a choice between survival and voluntary liquidation. High-growth firms are more likely than no-growth firms to exit by bankruptcy or voluntary liquidation. The probability of merger seems unrelated to prior sales growth.

for the Promotion of Science.

1. Introduction

There is increasing awareness that the exits of firms and entrepreneurs are not all failures (Headd, 2003; Harada, 2007). An early investigation by Schary (1991) breaks down the phenomenon of firm exit into several exit routes: merger, voluntary liquidation, and bankruptcy. Relatedly, Wennberg et al. (2010) focus on the determinants of four different exit routes: (1) harvest sale, (2) distress sale. (3) harvest liquidation, and (4) distress liquidation.

Although previous theorizing has suggested that performance is an important determinant of a firm's available exit choices, previous research has not investigated in great depth the role of pre-exit growth on exit routes. For example, Wennberg et al. (2010) control for several founder and firm characteristics, but not for pre-exit growth. One might expect that rapid-growth firms can achieve IPOs (initial public offerings) and lucrative offers for acquisition, while low-growth firms are more prone to bankruptcy. However, rapid growth may be associated with failure, if rapid growth firms struggle to balance their costs and revenues (Zhou et al., 2012; Pe'er et al., 2016; Coad et al., 2017). Voluntary exit might be unrelated to the previous growth performance, e.g. if individual's decisions to retire are independent of the firm's sales performance, or voluntary exit might be negatively related to previous growth performance, e.g. if voluntary exit depends on satisfaction with business performance. We argue that these intuitions and expectations deserve proper investigation.

We focus on 'shadow of death' effects on exit routes: in particularly, how sales growth - in the years immediately before exit - varies across exit routes. Griliches and Regev (1995) introduce the 'shadow of death' effect with their finding that firm productivity is low in the years before exit. Almus (2004, p199) reports that German SMEs have lower growth rates when there is "the shadow of death sneaking around the corner" (p199). Subsequent research has investigated the shadow of death effect for productivity (Blanchard et al 2014, Carreira et al 2011, Koski and Pajarinen 2015), pre-exit employment (Fackler et al., 2014), and firm performance before a succession event (Diwisch et al., 2006) or a merger (Kubo and Saito, 2012).[1] Kiyota and Takizawa (2006), Kubo and Saito (2012) and Yamakawa & Cardon (2017) investigate shadow of death effects in Japan.

Growth and survival are two of the most important indicators of new firm performance (Miller et al., 2013). We contribute to the literature by seeing how exit routes are related to previous sales growth. We also contribute by seeing how the shadow of death effect varies across exit routes.

2. Background and Hypotheses development

2.1 Standard view on exit routes

---

[1] Closely related to our current research is the work that has briefly investigated the performance of Japanese firms in the 2 years before a merger event (Kubo and Saito, 2012, see their Tables 2 and 3 and Figure 1).

Research into firm survival has emphasized that there are several distinct exit routes available to entrepreneurs: "entrepreneurs are busy examining varying exit routes" (Wennberg and DeTienne, 2014, p5). Entrepreneurs make a "conscious selection of exit strategy from among multiple options" (DeTienne and Cardon, 2012, p352). Instead of treating exit as a dichotomous variable, the exit routes featured in previous studies include: initial public offerings (IPO), mergers and acquisitions, management buy-outs, employee buy-outs, sale to a third party, sale to another business, voluntary or involuntary liquidation and bankruptcy (Wennberg and DeTienne, 2014, Coad, 2014).[2] In our dataset, the exit routes are: merger & acquisition, voluntary liquidation, bankruptcy, and also a few cases of IPO.

These exit routes can be arranged into some sort of 'pecking order' according to their desirability, according to what we might call the 'standard view'. "The exit path that an entrepreneur chooses is important because different paths provide different levels of risk (and thereby potential reward), complexity, and level of potential entrepreneurial engagement after exit." (DeTienne and Cardon 2012 p355).

The best available option for an entrepreneurial exit is an IPO, or a lucrative acquisition (Wennberg et al., 2010, Arora and Nandkumar, 2011). Some scholars highlight firm exit via acquisition as a strategic goal towards which firms aspire, and that they actively court (Graebner and Eisenhardt, 2004; Villalonga and McGahan, 2005; Cefis and Marsili, 2012). Hence, firms seeking an exit, might first aim for a merger or acquisition (M&A), and if that is not possible, either survive or go for voluntary liquidation. Voluntary liquidations can be a satisfying means for an entrepreneur to exit a business. Examples of voluntary liquidation include a founder's retirement, a desired career change, or their withdrawal from the business due to illness or injury (Harada, 2007; Wennberg et al 2010). Beyond a certain point, however, perhaps survival and voluntary liquidation are no longer possible, and bankruptcy may be the only option. Bankruptcy is a forced closure, the entrepreneur makes no financial gain from the enterprise and may face stiff legal consequences (especially in Japan). If things get so bad that the firm approaches bankruptcy, there may be no option but to quickly seek a distress sale or to voluntarily liquidate or to survive by some radical restructuring of businesses practices. Indeed, bankruptcy is at the bottom of the pecking order.

We therefore consider that firms compete for their preferred exit route, with the best-performing firms achieving the most desirable exits, and firms with worse performance experiencing relatively unattractive exits. Wennberg and Detienne (2014, p5) write that "performance has an important impact on potential exit routes, the development of exit strategies and the process of entrepreneurial exit (Wennberg et al., 2010)." Therefore, "if researchers wish to empirically test the likelihood of exit, they also need to control for performance (e.g. earnings from self-employment on the individual level or with profitability measures on the firm level), which otherwise would constitute a severe case of omitted variable bias." (Wennberg and Detienne, 2014, p12). In the present study, we measure performance in terms of a firm's growth path in the years immediately before exit. Sales growth is one of the main indicators of firm performance (Miller et al., 2013). Firms facing positive sales growth would be expected to exit via more attractive routes than firms with declining sales.

To summarize, then, entrepreneurs and their firms can initially choose between a 'multitude' of exit routes that are available to them. However, the exit route that they take depends on their relative performance in the years before exit. The best performing firms, i.e. those with positive

---

[2] The literature has even invented the concept of an "involuntary exit strategy", although we doubt that something truly strategic can also be involuntary.

sales growth, are more likely to exit via IPO or M&A, while firms with declining sales are more likely to exit via bankruptcy. Firms with stagnant sales are more likely to exit via voluntary liquidation. These notions are represented in Figure 1.

In the standard view on exit routes, firms start with the initial size (often assumed to be the same initial size, e.g. Jovanovic, 1982), and post-entry growth is determined by a series of unanticipated shocks that are beyond the control of the entrepreneur (in accordance with Gibrat's law and Gambler's Ruin theory, Levinthal 1991; Le Mens et al., 2011; Storey, 2011; Coad et al., 2013). Initial size might well proxy for aspiration level. If a firm's size (e.g. in terms of sales) decreases after entry, this could be perceived as unsatisfactory. If size increases after entry, this is probably encouraging. The post-entry evolution is unpredictable, and even if entrepreneurs have plans for their exit route, they may not be able to fulfil these ambitions. Few firms would plan to go bankrupt, but bankruptcies often happen. Firms may plan to experience a successful exit (IPO or trade sale), but these optimistic plans are somewhat out of their control.

Overall, the standard view would consider that:

Proposition 1: Successful firms have sustained post-entry growth and pursue an exit via M&A or IPO

Proposition 2: Firms with a mediocre post-entry growth performance (neither a great success nor a great failure) may opt to exit via a voluntary liquidation

Proposition 3: Unsuccessful firms have a disappointing post-entry performance and will exit via bankruptcy

Proposition 2, in particular, is not precisely defined: Entrepreneurs who engage in voluntary liquidation might report feeling satisfied with their outcome, although this could be more to do with their optimism, and 'snatching victory from the jaws of defeat' than with objective performance metrics (Marlow et al., 2011; Coad, 2014). We consider it to be an interesting empirical question to see if voluntary liquidations are closer to bankruptcies or to acquisitions.
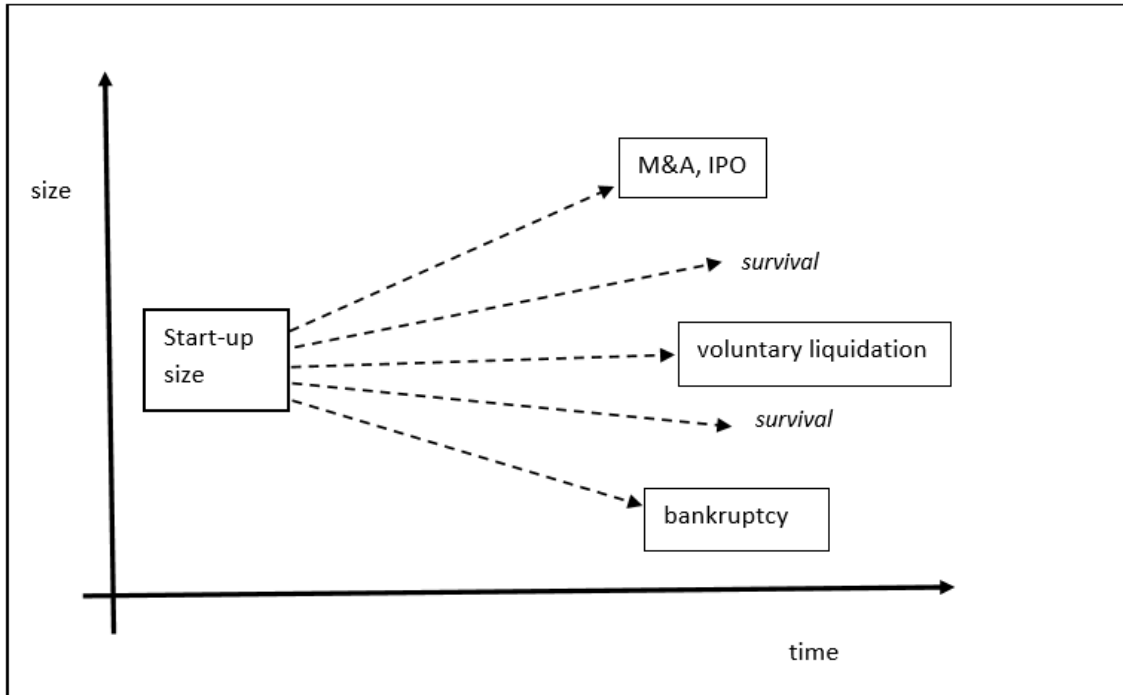
Figure 1: Standard view on exit routes.

2.2 Japanese context on exit routes

A drawback of the standard model is that not all exit routes are relevant for all firms at the same time. The reality is more complex. To suggest that firms have a choice between exit routes is like supposing that people have a choice between entering retirement, getting married, or dying of a drug overdose. Yes, people face these choices, but they tend not to be susceptible to all options at the same time. Firms engaging in different exit routes differ quite clearly by size. Hence, not all possible exit routes will be simultaneously available to all firms, because the availability of exit routes depends on a firm's circumstances.[3] In Cefis and Marsili (2012, Table 1) firms that exit by M&A have about twice as many employees as those that exit via failure, and about half as many employees as those that exit via restructuring.

Another limitation is that the standard view on exit routes cannot be directly applied to the Japanese case, because the exit routes have different meanings in the Japanese institutional context (for example, bankruptcy is prohibitively punitive for small firms, and many acquisition events are 'rescue mergers'). Broadly speaking, all of our observed exit routes (merger, voluntary liquidation, and bankruptcy) are considered as 'bad news' in the Japanese context, because they are closer to failures than successes. Indeed, exit routes have different meanings in different cultural and country contexts (Wennberg and Detienne, 2014). We now modify the standard conceptualization of exit routes to incorporate some specificities of the Japanese context.

---

[3] To be fair, this idea has been hinted at in the previous literature, e.g. Wennberg and DeTienne (2014, p9): "the type of exit routes available and the willingness to exit may differ significantly between lifestyle entrepreneurs and growth entrepreneurs."

In the following subsections, we discuss the cases of bankruptcy, voluntary liquidation, and M&A, in the Japanese context. Japan has bank-based rather than equity-based finance for new ventures. IPOs are quite rare, especially for firms (such as those in our sample) aged less than 10 years.

2.2.1 Bankruptcy in Japan

In Japan, there are some cases that firms without solvency applied for court protection under the Bankruptcy Law, as well as those applied for it under the Corporate Rehabilitation Law, and the Civil Rehabilitation Law enacted in April 2000 in Japan. In addition, firms whose bills are no longer honored by banks are regarded as bankruptcy even if they are not necessarily judged as bankruptcy by a court. Not only firms legally declared as bankruptcy but also inactive firms from economic viewpoint are regarded as bankrupt in Japan. In general, firms try to avoid this, for example, by declaring voluntary liquidation before they get to the point of bankruptcy. Large companies can afford bankruptcy involving further costs and time, but not small firms (Harada, 2007). Large firms are better positioned to bear the costs of bankruptcy, since the costs of bankruptcy are larger in small firms. Since bankruptcy has strong legal implications, small firms do everything they can to avoid it (Kato and Honjo, 2015). They go for voluntary liquidation instead (Harhoff et al., 1998).

2.2.2 Voluntary Liquidation in Japan

On the contrary, there may be a variety of reasons of voluntary liquidation. For example, some managers may want to dissolve their businesses before facing insolvency because they recognize that their businesses are not longer going well (e.g. if sales are in decline). Other managers may be forced to close their companies because they are approaching retirement age and cannot find any successor. In addition, managers that have alternative employment opportunities with higher wages may voluntarily dissolve their businesses. Harada (2007) investigated the reasons for exits of small firms in Japan. He found that while 40% of the exits are economically driven, others are not caused by economic reasons. Among non-economic-forced exits, aging of managers is the most common reason for exit.

2.2.3 Mergers and Acquisitions in Japan

The desirability of selling the firm in the context of an acquisition is not always clearcut. Wennberg et al., (2010) distinguish between a harvest sale and a distress sale. Successful firms get acquired, in which case we would expect rapid sales growth in the years before acquisition. However, distress sales (i.e. acquisition of underperforming firms that are being badly managed) also occur, in which case we would expect a disappointing sales growth in the years before acquisition.

M&A's have a different nature compared to M&As in the USA. Indeed, the significance of merger events varies across countries (Kubo and Saito, 2012). For example, M&As vary a lot over the business cycle, while bankruptcy is more constant over the business cycle (Kiyata and Takizawa, 2007, Figure 1), and M&As in Japan are countercyclical, whereas in the USA they are procyclical (Mehrotra et al., 2008). This is because M&As occur because of a logic of 'rescue mergers' to rescue distressed firms, rather than aggressive expansion during economic booms. Indeed, there are many "rescue mergers" in Japan (more so than in other countries). These are usually not considered to be successful outcomes. In the Japanese context, the term 'rescue merger' is often used (Ito, 2011; Kubo and Saito, 2012) to refer to situations where a

merger is set up to rescue a distressed firm. In some countries, the category 'M&A' refers primarily to acquisitions (e.g Cefis and Marsili, 2012, footnote 4), but in our data, M&A refers primarily to (rescue) mergers. For large firms in Japan, survival is generally considered to be the best outcome.

M&A events usually involve large firms, not small firms. Small firms in Japan simply do not engage in M&A. According to the Annual Report on Japanese Start-up Business 2016 by Venture Enterprise Center, the number of M&As as an exit mode is much smaller than that of IPOs for Japanese startups.
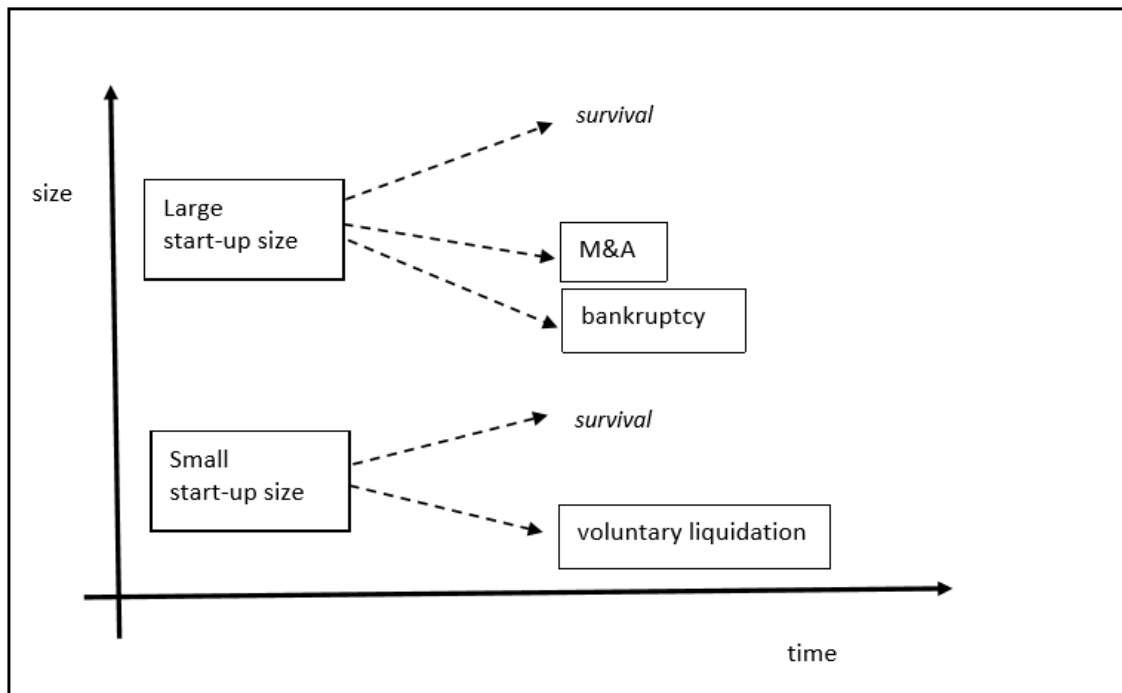

Figure 2: Simplified representation of exit routes in Japan.

In the Japanese context, rescue mergers are a useful option to sell the assets if the firm encounters difficulties. Bankruptcy is the worst possible outcome. For large firms, voluntary liquidation is not really an option, because it essentially involves selling the (huge collection of) assets in a deal that would resemble a rescue merger.

For small firms, survival is also the best option. Acquisitions are rare and rescue mergers are not relevant if the firm is small. Small firms seek to avoid bankruptcy at all costs. Instead, the only appealing exit option would be voluntary liquidation.

Figure 2 summarizes the hypothesized exit routes available to firms in the Japanese context.

3. Data

The data used in this study comes from *COSMOS2* based on credit investigation by Teikoku Databank Ltd. (TDB). This data source covers more than half of incorporated firms in Japan,

and consists of firms in manufacturing, software and information services, other services, movie and video production, and postal and telecommunication services sectors founded between 2003 and 2010, and includes information on the survival and exit of such firms from their year of entry to the end of 2013. Companies founded in 2003 are therefore visible in all periods until 2013 (unless they exit before 2013 and hence leave the sample early), while companies founded in 2010 are only included in the data for a maximum of 4 years (because the sample ends in 2013).

The data provides information not only on whether a firm exits but also its exit route (bankruptcy, voluntary liquidation, and merger). Besides information on survival and exit, this source provided information on founder-, firm-, industry-, and region-level characteristics, such as the founder's educational background, the firm's sales, industry code, and location. Previous work on this same data includes Kato et al. (2017).

As for exit route, we classify exits into three routes---bankruptcy, voluntary liquidation, and merger, using classifications in *COSMOS2*. Bankruptcy is the situation in which firms cannot repay their debt and thus cease operations, and includes firms that apply for court protection under the Bankruptcy Law, as well as those that apply for it under the Corporate Rehabilitation Law or the Civil Rehabilitation Law. Additionally, when banks stop providing credit to service bills payable, firms are considered bankrupt even in the absence of a court judgment. That is, we here define bankruptcy to include not only firms legally declared bankrupt but also those that are inactive economically. In contrast, voluntary liquidation indicates the situation where firms voluntarily dissolve their businesses without insolvency. A number of reasons may exist for voluntary liquidation, although their precise definition can be difficult. Third, merger describes the situation in which a firm disappears owing to a merger with another firm.

Our data includes information on a firm's annual sales, although these numbers for annual sales may be approximated by rounding. The credit investigation company asks the manager about the numbers for total annual sales, number of employees, profits etc, although the managers do not necessarily disclose the exact amount. So, the investigators usually attempt to obtain this information by a number of means, for example, by asking "is the number same as the previous year? Is it more than the previous year". This explains why the number for sales is sometimes same as the previous year (i.e. change of zero yen from one year to the next), and why we have a likely over-representation of annual growth rates of sales of exactly zero.

4. Analysis

Table 1 show the exit events by observation year. Exit events are generally quite rare in our data. Previous research has shown that up to 50% of firms exit after their first 3 years (e.g., Bartelsman et al., 2005; Coad, 2018). One reason for the low exit rate in our data is that *COSMOS*2 is based on the company register that does not include sole proprietorships. Our sample is limited to joint-stock companies that are relatively large compared to that used in previous literature.

Table 1 shows the exit events from the first year onwards.[4] For none of the exit routes does the number of exit events peak in the first year. Exits in the first year are rare for each of the three exit routes. Instead, an initial 'honeymoon' period is seen for each exit route. Bankruptcy and Merger both peak in the 3rd year. Voluntary liquidation peaks in the 4th year.

4.1 Non-parametric analysis

Table 1. Summary statistics on the different exit routes by observation year.

Exit route	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	11th year
Bankruptcy	3	34	51	38	41	43	24	17	8	4	0
Voluntary liquidation	3	26	67	70	39	26	21	4	3	1	2
Merger	6	36	84	49	49	37	23	17	12	9	1
N	6213	6201	6105	5611	4704	3668	2639	1631	1462	532	71

4.2 Rapid growth and type of exit

It is theoretically interesting to investigate whether the probability of survival varies over the growth rate distribution. Firms facing rapid decline may be more likely to exit on unfavorable terms. Growth may be positively related with survival, overall. However, excessive growth could lead to financial problems (such as difficulties in keeping a balance between incoming cashflow and rising costs), possibly suggesting that rapid growth could increase the likelihood of an exit on unfavorable terms.

An important methodological choice relates to the relevant number of years of growth history. Are 2 years sufficient? 4 years? All years since start-up? There is a tradeoff between having longer growth history (fewer observations) and focusing on a shorter history (if longer lags are not significant). Overall, we select a model with 2 lags, in keeping with previous literature (e.g. Kubo and Saito, 2012). The 3rd lag of sales growth is not significant in our analysis.

Figure 3 below shows that the probability of exit varies over the growth rate distribution. Bankruptcy is more likely for firms experiencing rapid decline, in line with expectations, although it is interesting that the probability of bankruptcy is positive across the growth rate distribution, such that even firms with moderate or rapid growth are vulnerable to exit via bankruptcy. The results for voluntary liquidation are similar to those for bankruptcy: exit routes are higher for firms experiencing rapid decline, but are positive across the growth rates distribution. With regards to merger, the probability of exit is remarkably constant across the growth rates distribution. It seems that exit by merger is quite unrelated to a firm's recent growth performance. This is puzzling from the perspective of our theorizing in sections 2.1 and 2.2.

---

[4] Note that the earliest years are not included in the regressions, because these observations are lost due to the inclusion of lagged growth as independent variable.

Figure 3 motivates the inclusion of a quadratic term for growth in our exit regressions, because the relationship between growth and survival displays an inverted-U relationship, with a peak in the centre of the growth rate distribution.

Figure 3: Survival rates (t:t+1) for each exit route across the growth rates distribution (t-1:t). Only the first lag of growth is considered here. All years pooled together.
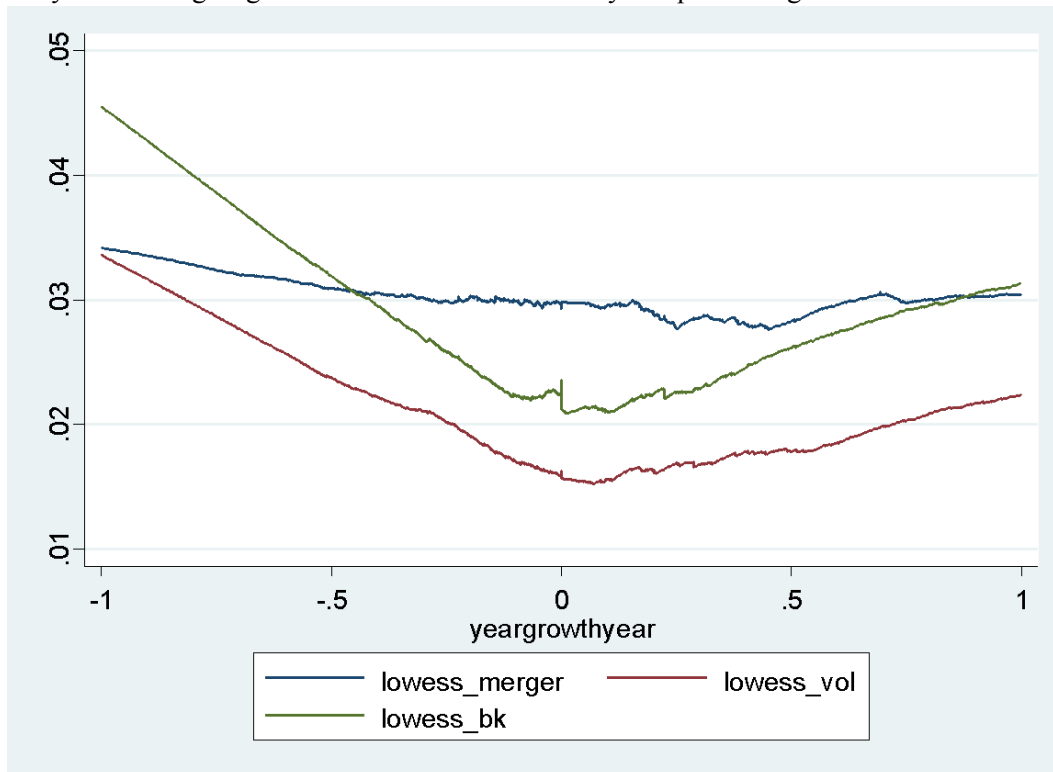
4.3 Growth paths analysis

Table 2 below shows the pre-exit growth paths, and survival rates, for each exit route (following the methodology in Coad et al., 2013). Two consecutive periods of decline (below-median growth) are associated with highest frequencies of all exit events: bankruptcy, VL and merger. The highest survival rates are associated with two consecutive periods of above-median growth for each of the exit routes. However, exits are observed for each configuration. Even firms with consistent above-average growth can sometimes go bankrupt or merge or VL. This is a reminder that bankruptcy is not necessarily brought on by decline, but instead it occurs because of an imbalance between revenues and costs.

A potential limitation of this analysis in Table 2 is that we have many medians (growth=0). This is due to the nature of the data collection.

Table 2. Growth paths and survival rates for each exit route

| | Lagged growth | | | Survival rates | | | | | |
| | | | | Bankruptcy | | Voluntary | | Merger | |
Growth path	1 year lag	2 year lag	Obs.	%	N	%	N	%	N
1	+	+	7749	99.3	54	99.3	55	99.3	54
2	+	-	6168	99.2	50	99.3	44	99.1	56
3	-	+	6520	99.1	56	99.1	62	99.1	56
4	-	-	6445	98.9	69	99.0	63	99.1	61

Notes. + means above-median growth (including median). – indicates below-median growth (including median).

5. Parametric analysis

5.1 Regression analysis

We examine the effects of lagged growth on subsequent survival according to exit route. Table 3 presents information on the definitions of the variables, and Table 4 presents some summary statistics.

Figure 4 shows how the exit routes vary according to size. The main finding is that the option of merger is only relevant for firms that are large. Voluntary liquidation is more relevant for the smallest firms.

Table 3. Definition of variables.

Variable	Definition
(Dependent variable)	
Pooled exit	Dummy variable: 1 if the firm exits in accounting period $t+1$, 0 otherwise.
Bankruptcy	Dummy variable: 1 if the firm exits via bankruptcy in accounting period $t+1$, 0 otherwise.
Voluntary liquidation	Dummy variable: 1 if the firm exits via voluntary liquidation in accounting period $t+1$, 0 otherwise.
Merger	Dummy variable: 1 if the firm exits via merger in the t th accounting period, 0 otherwise.
(Firm-level characteristics)	
1-year lagged growth	Differences in the logarithm of turnover in accounting periods t-1 and t.
1-year lagged growth^2	1-year lagged growth×1-year lagged growth
2-year lagged growth	Differences in the logarithm of turnover in accounting periods t-2 and t-1.
2-year lagged growth^2	2-year lagged growth×2-year lagged growth
Log sales	Logarithm of turnover in period t.
Log sales^2	Log turnover × log turnover
Firm age	Number of years since the foundation.
(Founder-level characteristics)	
Founder age	Founders' age at start-up.
Founder age^2	Founder age × founder age
Male founder	Dummy variable: 1 if the founder is male, 0 otherwise.
Founder's education (university)	Dummy variable: 1 if the founder has university education at start-up, 0 otherwise.
Founder's education (unknown)	Dummy variable: 1 if founder's educational background is unknown, 0 otherwise.
(Others)	
Cohort dummies	Dummy variables for different years of establishment (2003--2010).
Sector dummies	Dummy variables for different industries (manufacturing, information services, other services, movie and video production).
Region dummies	Dummy variables for different regions (Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku/Shikoku, Kyushu)

Table 4. Summary statistics for independent variables used in the regressions.

| Variable	Mean	S.D.	Min	Max
(Dependent variables)				
Pooled exit	0.026	0.161	0	1
Bankruptcy	0.009	0.092	0	1
Voluntary	0.008	0.090	0	1
Merger	0.010	0.098	0	1
(Independent variables)				
growth (1st lag)	0.054	0.412	-5.067	5.011
growth (1st lag)^2	0.173	0.685	0	25.673
growth (2nd lag)	0.155	0.576	-7.313	6.344
growth (2nd lag)^2	0.356	1.345	0	53.483
Log sales	5.204	1.743	0	13.583
Log sales^2	30.123	21.289	0	184.508
Firm age	5.845	1.708	4	11
Founder age	46.846	11.301	18	87
Founder age^2	2322.284	1077.380	324	7569
Male founder	0.961	0.195	0	1
Founder's education (university)	0.462	0.499	0	1
Founder's education (unknown)	0.415	0.493	0	1
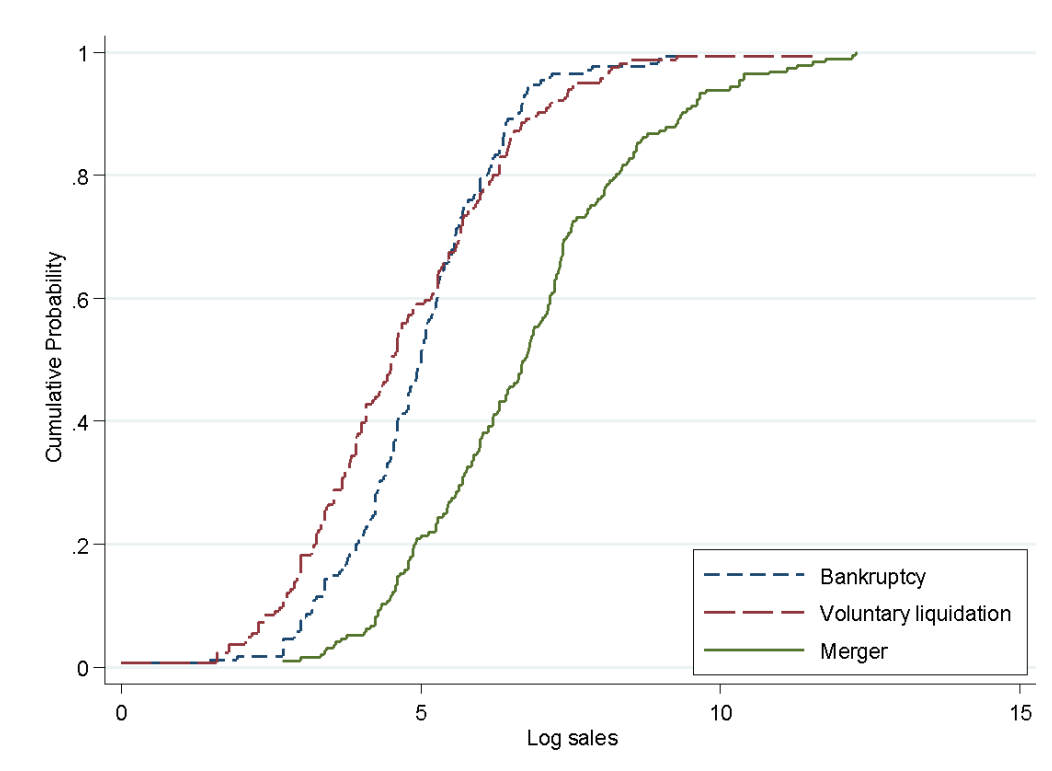
Figure 4: Cumulative probability of log sales in period t for each exit route.

We begin with a regression for all exit routes pooled together. This is done using a logit duration model (Wiklund, Baker, and Shepherd, 2010; Coad et al., 2013). Our regressions for the competing risks of having different exit routes are done using discrete-time survival models in the form of multinomial logit regressions (Schary, 1991; Wennberg et al., 2010; Cefis and Marsili 2011, 2012).

It is possible that one exit route will censor the firm from experiencing a different type of exit route. Hence, an assumption is that the probability of any exit route is independent of experiencing a competing exit route. This assumption has been made in the previous literature, and is especially reasonable in our case, because the probabilities of each exit route are all quite low (exit events are rare in our data).

Table 5. Regression results.

Variable	Logit	Multinomial logit		
	Pooled exit	Bankruptcy	Voluntary liquidation	Merger
1 year lagged growth	-0.357***	-0.333**	-0.363**	-0.386**
	(0.099)	(0.161)	(0.171)	(0.185)
1-year lagged growth^2	0.135***	0.153***	0.0769	0.156***
	(0.043)	(0.047)	(0.072)	(0.053)
2-year lagged growth	-0.240***	-0.227*	-0.128	-0.390**
	(0.080)	(0.126)	(0.121)	(0.152)
2-year lagged growth^2	0.0354*	0.0559**	0.0226	0.0364
	(0.019)	(0.024)	(0.023)	(0.033)
Log sales	0.185*	0.642*	-0.27	1.325***
	(0.108)	(0.331)	(0.170)	(0.220)
Log sales^2	-0.00594	-0.0677**	0.0111	-0.0654***
	(0.008)	(0.030)	(0.014)	(0.015)
Firm age	-0.105***	-0.0529	-0.293***	-0.0218
	(0.032)	(0.051)	(0.063)	(0.053)
Founder age	0.0397	0.0557	0.0119	0.0611
	(0.031)	(0.059)	(0.046)	(0.055)
Founder age^2	-0.000329	-0.000506	-7.91E-05	-0.000525
	(0.000)	(0.001)	(0.000)	(0.001)
Male founder	0.314	-0.0721	0.799	0.319
	(0.276)	(0.392)	(0.527)	(0.588)
Founder's education (university)	0.0801	-0.740***	0.425	1.352***
	(0.145)	(0.204)	(0.303)	(0.424)
Founder's education (unknown)	-0.144	-0.848***	0.464	0.829*
	(0.149)	(0.208)	(0.302)	(0.435)
Constant term	-5.021***	-6.362***	-3.170**	-12.86***
	(0.899)	(1.754)	(1.407)	(1.815)
Cohort dummies	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes	Yes
Observations	20,318	20,318		
Log pseudolikelihood	-2422.048	-2878.5738		
Pseudo R2	0.0251	0.0636		

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5 reports the regression results. Regarding lag selection, the results in Table 5 (both logit and multinomial logit) show that the second lag is significant, but further investigation shows that the 3rd and 4th lags are not significant (results not shown in detail here). It suggests, at least in our sample, that the growth history going back 2 years (not more) is sufficient to estimate a firm's survival chances and exit route.

Table 6 shows that large firms are more likely to exit via bankruptcy or merger (in line with the predictions in Figure 2). Firm age reduces the probability of exit only in the case of exit by voluntary liquidation, not for the cases of bankruptcy or merger. Education of founder is positively associated with bankruptcy, which is puzzling at first, and could perhaps be because highly-educated founders might found more innovative ventures that have higher downside risks (Arora and Nandkumar, 2010). Education of founder is negatively associated with merger, however. Education of founder is not significantly associated with voluntary liquidation. This is perhaps surprising, because we might have expected that more educated entrepreneurs, who have better outside options, might be more willing to exit the firm if its performance is below expectations (Gimeno et al., 1997).

The R2 statistics in Table 6 are quite low. Although we have found some interesting predictors of exit routes, nevertheless there is a lot of unexplained variation in exit routes.

5.2 Robustness analysis

We repeated the regressions with 3rd and 4th lags, but these lags are not significant.

We repeat the analysis by dropping observations of sales growth in the first year, because of concern about possible partial year effects (Bernard et al, 2017). The results are similar.

We also estimated using a complementary log-log model (Cefis and Marsili, 2012). The results are generally consistent with those using the multinomial logit model.

A limitation of this database is the inability to distinguish between independent startups and spinoff startups. Spinoffs are expected to start larger than independent startups. Therefore, we check the robustness of our results after dropping the largest companies. Start-up size is approximately lognormally distributed, with no clear threshold at which a distinct category of 'large firms' appears. We therefore undertake robustness analysis by dropping the largest 5% of firms, and get similar results.

6. Conclusion

There is growing recognition that entrepreneurial exit events are not all failures, but that there are different categories of exit events, and that some correspond to successful 'harvest'-type exits (e.g. Wennberg et al., 2010). These exit routes are assumed to depend on pre-exit performance. However, there is a lack of evidence on how firm performance evolves in the years immediately before exit, for different exit routes. Is it possible to detect early signals of whether a firm will be acquired or bankrupt? Can cases of voluntary liquidation be predicted in advance? We contribute to the literature by investigating how sales growth evolves in the years before exit.

We begin by formulating what we call the 'standard view' on pre-exit growth across exit routes, before adjusting the standard model to the case of Japan. Indeed, we reiterate previous suggestions that the cultural and country institutional context matters with regards to interpreting the significance of exit routes (Wennberg and DeTienne, 2014). In the Japanese context, all of the exit routes (merger, voluntary liquidation, bankruptcy) are generally considered to be 'bad news' - being closer to failure than to success.

Our analysis suggests that focusing on the 2 years before exit is sufficient. Adding further lags does not help to significantly predict exit routes. Non-parametric graphs and statistics, as well as multinomial logistic and complementary log-log regressions, suggest that sales growth generally reduces the probability of exit by bankruptcy, voluntary liquidation, and also merger. However, the relationship is U-shaped - such that rapid growth actually increases the probability of exit for all of the three exit routes. More generally, each of the three exit routes can occur all across the growth rate distribution. Large firms are more likely to exit via bankruptcy or merger. Firm age reduces the probability of exit only in the case of exit by voluntary liquidation.

Our analysis suggests that, overall, sales growth in the years before exit is a significant predictor of exit routes. Growing firms have overall lower chances of bankruptcy, as might be expected. Voluntary liquidation and merger are overall closer to 'failures' than successful exit strategies in our dataset and institutional context. Overall, the growth performance of firms can help predict which exit route a firm will take, taking into account that not all exit routes are relevant for all firms at the same time, and also that the interpretation of exit strategies differs across national and institutional contexts.

References

Almus M., (2004). The Shadow of Death - An Emperical [sic] Analysis of the Pre-Exit Performance of New German Firms. Small Business Economics 23: 189-201.

Arora, A., & Nandkumar, A. (2011). Cash-out or flameout! Opportunity cost and entrepreneurial strategy: Theory, and evidence from the information security industry. Management Science, 57(10), 1844-1860.

Bae, K. H., Kang, J. K., & Kim, J. M. (2002). Tunneling or value added? Evidence from mergers by Korean business groups. Journal of Finance, 57(6), 2695-2740.

Bartelsman, E., Scarpetta, S., & Schivardi, F. (2005). Comparative analysis of firm demographics and survival: evidence from micro-level sources in OECD countries. *Industrial and Corporate Change*, *14*(3), 365-391.

Bernard, A. B., Massari, R., Reyes, J. D., & Taglioni, D. (2017). Exporter dynamics, firm size and growth, and partial year effects. American Economic Review 107 (10), 3211-3228.

Blanchard, P., Huiban, J. P., & Mathieu, C. (2014). The shadow of death model revisited with an application to French firms. Applied Economics, 46(16), 1883-1893.

Carreira, C., & Teixeira, P. (2011). The shadow of death: analysing the pre-exit productivity of Portuguese manufacturing firms. Small Business Economics, 36(3), 337-351.

Cefis, E., & Marsili, O. (2011). Born to flip. Exit decisions of entrepreneurial firms in high-tech and low-tech industries. Journal of Evolutionary Economics, 21(3), 473-498.

Cefis, E., & Marsili, O. (2012). Going, going, gone. Exit forms and the innovative capabilities of firms. Research Policy, 41(5), 795-807.

Coad, A (2014). Death is not a success: Reflections on business exit. International Small Business Journal, 32(7) 721-32.

Coad A, Frankish J, Roberts R, Storey D, (2013). Growth paths and survival chances: An Application of Gambler's Ruin Theory. Journal of Business Venturing, 28, 615–632.

Coad A., Frankish J.S., Roberts R.G., Storey D.J. (2017). Too fast to live? Effects of growth on survival across the growth distribution. Mimeo.

Coad, A. (2018). Firm age: a survey. Journal of Evolutionary Economics, 28(1), 13-43. https://doi.org/10.1007/s00191-016-0486-0

DeTienne, D. R., & Cardon, M. S. (2012). Impact of founder experience on exit intentions. Small Business Economics, 38(4), 351-374.

Diwisch, S., Voithofer, P., & Weiss, C. (2006). The 'Shadow of Succession': A Non-Parametric Matching Approach. Mimeo.

Fackler, D., Schnabel, C., & Wagner, J. (2014). Lingering illness or sudden death? Pre-exit employment developments in German establishments. Industrial and Corporate Change, 23(4), 1121-1140.

Graebner, M. E., & Eisenhardt, K. M. (2004). The seller's side of the story: Acquisition as courtship and governance as syndicate in entrepreneurial firms. Administrative Science Quarterly, 49(3), 366-403.

Griliches, Z., & Regev, H. (1995). Firm productivity in Israeli industry 1979–1988. Journal of Econometrics, 65(1), 175-203.

Harada, N (2007). Which firms exit and why? An analysis of small firm exits in Japan. Small Business Economics 29, 401-414.

Harhoff, D., Stahl, K., & Woywode, M. (1998). Legal form, growth and exit of West German firms—empirical results for manufacturing, construction, trade and service industries. *Journal of Industrial Economics*, *46*(4), 453-488.

Headd B., (2003). Redefining Business Success: Distinguishing between Closure and Failure. Small Business Economics 21, 51-61.

Honjo, Y. (2015). Why are entrepreneurship levels so low in Japan? Japan and the World Economy, 36, 88-101.

Ito, T. (2011). Reform of financial supervisory and regulatory regimes: what has been achieved and what is still missing. International Economic Journal, 25(4), 553-569.

Jovanovic B. (1982). Selection and the Evolution of Industry. Econometrica, 50 (3), 649-670.

Kato, M., & Honjo, Y. (2015). Entrepreneurial human capital and the survival of new firms in high-and low-tech sectors. Journal of Evolutionary Economics, 25(5), 925-957.

Kato M, Onishi K, Honjo Y, (2017). Does patenting always help new-firm survival? Kwansei Gakuin University School of Economics, Discussion paper 159.

Kiyata, K., & Takizawa, M. (2007). The shadow of death: Pre-exit performance of Firms in Japan. Discussion Paper Series No.204, Hitotsubashi University.

Koski, H., & Pajarinen, M. (2015). Subsidies, the shadow of death and labor productivity. Journal of Industry, Competition and Trade, 15(2), 189-204.

Kubo, K., & Saito, T. (2012). The effect of mergers on employment and wages: Evidence from Japan. Journal of the Japanese and International Economies, 26(2), 263-284.

Le Mens G, Hannan M.T., Polos L., (2011). Founding Conditions, Learning, and Organizational Life Chances: Age Dependence Revisited. Administrative Science Quarterly 56, 95-126.

Levinthal D.A., (1991). Random walks and organizational mortality. Administrative Science Quarterly 36 (3), 397-420.

Mehrotra, V., van Schaik, D., Spronk, J., & Steenbeek, O. W. (2008). Impact of Japanese Mergers on Shareholder Wealth: An Analysis of Bidder and Target Companies. Erasmus Research Institute of Management (ERIM) Report Series, ERS-2008-032-F&A, 28 May 2008.

Miller CC, Washburn NT, Glick WH (2013). The myth of firm performance. Organization Science 24 (3), 948-964.

Pe'er A., Vertinsky I., Keil T., (2016). Growth and Survival: The Moderating Effects of Local Agglomeration and Local Market Structure. Strategic Management Journal, 37 (3), 541–564.

Schary, M.A., (1991). The Probability of Exit. Rand Journal of Economics, 22(3), 339-353.

Storey DJ (2011) Optimism and chance: The elephants in the entrepreneurship room. International Small Business Journal 29(4): 303–321.

Villalonga, B., & McGahan, A. M. (2005). The choice among acquisitions, alliances, and divestitures. Strategic Management Journal, 26(13), 1183-1208.

Wennberg K, Wiklund J, Detienne D.R., Cardon M.S. (2010). Reconceptualizing entrepreneurial exit: divergent exit routes and their drivers. Journal of Business Venturing 25, 361-375.

Wiklund, J., Baker, T., & Shepherd, D. (2010). The age-effect of financial indicators as buffers against the liability of newness. Journal of Business Venturing, 25(4), 423-437.

Yamakawa, Y., & Cardon, M. S. (2017). How prior investments of time, money, and employee hires influence time to exit a distressed venture, and the extent to which contingency planning helps. Journal of Business Venturing, 32(1), 1-17.

Zhou, H., de Kok, J., Hartog, C., & van der Zwan, P. (2012). The risk of growing fast: Does fast growth have a negative impact on the survival rates of firms? Frontiers of Entrepreneurship Research, 32(9), 1.