After the Thrill is Gone:
Replacement of Executives in Imperiled VC-backed Companies

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PRELIMINARY and INCOMPLETE

Abstract: An extensive literature explores the determinants of success among venture-backed startups as well as the role played by professional investors in professionalizing their growing portfolio companies. However, scholars have rarely explored whether and how investors involve themselves when their portfolios appear not to be faring well. Among the population of VC-backed ventures from 1987 through 2012, we find that investors act to replace executives in failing portfolio companies as they begin to struggle. We also find that founders are the least likely to be replaced, in both good and bad times, in contrast to prior findings that founders are routinely replaced as the startup matures. Further, connections to investors or previous entrepreneurial executive experience do not lower the chances of replacement. The results suggest that investors do not abandon startups as quickly as one might expect, while executive turnover increases rapidly in bad times.

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Introduction

In a sample of over 22,000 VC-backed startups, Hall and Woodward (2010) found that 75% had a liquidation value of $0 while only 0.39% had an exit value of greater than $500MM. Given the high failure rate and likelihood that most non-defunct firms will not produce outsize returns, the hits-based nature of venture investing would indicate that investors should be quick to abandon ventures that begin to look unattractive. Indeed, extant literature on venture principals indeed suggests that investors prepare for the high likelihood of a negative outcome. In their review of venture capital contracts with entrepreneurs, Kaplan and Stromberg (2004) find asymmetric provisions that grant VCs strong control rights when startups do not continue to develop as expected. Given the risk that entrepreneurs may continue a business without strong financial prospects for non-pecuniary reasons (Hamilton, 2000), professional investors rarely provide all required capital up-front but rather stage infusions into rounds, preserving the principal's exit option (Gompers, 1995; Tian, 2011).

Thus, on the one hand investors appear to (prepare to) detach themselves from unpromising investment targets. On the other hand, anecdotes abound of investors who remained involved with portfolio companies long after prospects of an attractive exit had vanished. Union Square Ventures principal Fred Wilson, early investor in Twitter and Tumblr (the former planning a $1B IPO; the latter acquired by Yahoo for $1B), admits having been "involved with some businesses that are well into their second decade[,] and I am afraid that they may be headed into a third decade" (Wilson, 2013). While such extended involvement may be unusual, it may nonetheless be the case that VCs, like the directors of public companies, do not abandon their portfolios at the first sign of trouble but rather move aggressively to replace executive

management in failing companies (Coughlan and Schmidt, 1985; Weisbach, 1988; Bushman, et al. 2011).

As prior work has focused primarily on understanding positive outcomes of venture-backed startups, we have little insight into the fates of the vast majority of startups which do not achieve an attractive liquidity event. To be sure, scholars have documented that VCs spend time upgrading the management team (Hellmann and Puri, 2003, Wasserman, 2003); however, this is typically investigated in the context of "professionalizing" portfolio firms as they grow. In a notable exception, Puri and Zarutskie (2013), find that VC-backed ventures are less likely to fail during the first four post-investment years than are comparable non-venture-backed ventures. Following this period, however, the two types of ventures are equally likely to fail. What remains unexplored is whether and how investors exercise control rights and influence not merely to professionalize but also to effect course-correction when the startup appears to have gone off-track.

We attempt to shine light on the involvement of investors in imperiled portfolio companies by tracking executive replacement among the population of VC-backed ventures from 1987 through 2012 as identified by VentureSource and augmented by additional collection of individual biographies. Given that VentureSource does not report whether turnover is involuntary vs. voluntary, we begin by noting that noting that replacement of executives in VC-backed ventures is much more common in "cold" markets, when there are fewer outside opportunities to pull executives away. Moreover, executive replacements tend to cluster around the second and third rounds of financing, once investors have presumably had some time to observe the management team in action. Taken together, these suggest that principals are deliberately replacing members of the executive team.

We then investigate whether executive replacement is connected to poor performance of the startup. Given that the population is private firms, we cannot rely on stock prices but instead create a proxy in terms of whether the firms' next round of financing arrives unusually late as compared to others in the same industry and of the same vintage. The variable captures how an entrepreneurial firm behaved in between its financing events when either capital was difficult to raise or the firm struggled to meet internal targets. Firms that enter the state we call "living dead" are 25% less likely to IPO and 30% more likely to fail. In both cross-sectional and firm fixed-effect models, executives are at least 60% more likely to be replaced at "living dead" startups. Moreover, for the subset of these firms that recover—i.e., whose next round of financing comes in "on time" so to speak, we do not see continued replacement of executives. This behavior suggests that investors do not abandon their portfolio companies at the first sign of trouble but stay involved in an attempt to get the venture back on course. Finally, more experienced/active investors are more likely to replace executives in "living dead" portfolio firms.

We conclude our analysis by investigating the relationship between executive characteristics and firm performance in transitions. The patterns show that higher-level executives – CEOs and CTOs – have the highest probability of exit in both good times and bad. For CEOs, the transition probabilities are over 2.5 times higher in living dead states that in good times. Finally, more experienced executives and those with longer within-firm tenure are relatively less likely to be replaced. The collection of evidence provides a large sample view of investors taking an increased role in the replacement of management in bad times, contrary to the view that investors might "cut and run" at the first sign of trouble given the low prior probability

of venture success. Importantly, the evidence suggests that this involvement is relatively higher in these states.

Our second finding from the individual-level analyses in Table 8 is even more counterintuitive. Including both executives who are replaced with those who remain until firm exit, the regression analysis reveals that founders are the *least* likely to be replaced. This lower propensity is even stronger when the firm enters the living dead state, suggesting that in bad times the founder has the safest executive position. This finding seems quite surprising in light of prior research suggesting that founder/CEOs are routinely replaced as startups grow (Hellman and Puri, 2002; Wasserman, 2003). While we by no means claim that founders are never replaced, our results using the full population of executives in VC-backed startups suggest that founders are at much lower risk of being replaced than non-founding executives.

The paper makes four contributions to the literature. First, it helps to resolve the question of whether investors persist by trying to improve their portfolio companies even as they begin to struggle. Given the low prior probability of success, it is not obvious that investors would not disengage as soon as the portfolio company begins to struggle. The results of Kaplan et. al. (2009) suggest that management changes as firms grow. We document how management evolves in the more typical outcome of the high-growth entrepreneurial firm: failure. In the realm of public firms, many studies have shown that top management transitions typically occur following poor performance. This paper is the first to document the same behavior among private directors, using novel measures of pre-exit performance.

Second, this work contributes to a nascent literature on failure in the venture capital industry, which has been virtually ignored in previous work although the vast majority of VC-backed ventures do not produce highly attractive returns. Understanding how management and

investors interact in these situations highlights the role of financial intermediaries and another view of the riskiness of high-growth entrepreneurship. We also offer entrepreneurs a first look at how professional investors are likely to react to interim struggles.

Third, our results call into question the notion that founders are at especial risk of losing their jobs as startups grow. Our analyses using the full population of executives in VC-backed firms over a 20 year period indicate that founding executives are *less* likely than other executives to leave the company. Moreover, they are particularly resilient in trying times, whereas one might expect that professional investors would attempt to replace them with more seasoned managers. In fact, it is executives who were brought in following financing rounds (and thus presumably with the approval of investors) who are more likely to be replaced, particularly if they have prior experience in VC-backed ventures and even if they previously worked at a company backed by their current firm's investors.

More generally, we contribute to a perennial debate in the venture capital literature regarding the value of the VC firm and partner (e.g. Ewens and Rhodes-Kropf (2013) and Hellmann and Puri (2002)). To date, value added by investors has primarily been found at the point of investment selection or the monitoring of firms as they grow. Given that the majority of entrepreneurial firms fail, establishing that investors (attempt to) add value by replacing executives in imperiled ventures represents a novel contribution.

Data

The data comes from three sources. We begin with the management and executive team data available from Venture Source. Venture Source is a database of venture capital transactions,

entrepreneurial firms, investments and outcomes provided by Dow Jones. The data includes the full set of top-level managers, executives and investor board members. Important for this study, we observe an individual executive's title and whether there are multiple individuals with the same title. Such an instance forms the basis of our measurement of transitions. Unfortunately, the dates individual exit or join the firm is missing approximately 70% of the time. Thus, we supplement the management data with outside data collection via a large set of online resources to date exit and entry to the management team. Sources include company websites, Capital IQ, Zoominfo and public LinkedIn resumes. From this collection, we are able to add the join date for more than 5100 additional executives.

The sample for analysis is restricted in several ways. Because we are ultimately interested in transitions over time, we require the entrepreneurial firm to have at least two financing events. Similarly, we require time for such transitions to occur, so we consider only entrepreneurial firms founded prior to 2009. For the transition sample, we require a known transition date for those that have an ambiguous ordering. After the data collection discussed above, we are left with 8627 firms out of 6729 firms with at least one transition.

Dependent Variable: executive role transitions

The variables used in the first part of the analysis are measured at the entrepreneurial firm financing event. The major dependent variable ``Had Transition'' is a dummy variable equal to one if a financing had a transition at the time of the financing or after the financing and prior to any subsequent financing. In the second analysis, we construct a person-financing database that tracks entry and exit of executives at each entrepreneurial financing event. Here, ``Had

transition'' is a dummy if an executive was replaced at the current financing or some time prior to the subsequent financing.

Executive transitions are identified as follows. The first step is to identify groups of people who held the same title within the same firm. We normalize job titles both by level (e.g., "VP" and "Vice President") and by function (e.g., "Software Development" vs. "Software Engineering") while being careful not to lump together titles at the same level and in the same function that are nonetheless distinct (e.g., "VP North American Sales" and "VP International Sales"). Fortunately, since we aim to identify within-firm transitions, most of the within-firm variation in title naming is due to typography. We then discard "joint" titles that can be held simultaneously (e.g., "Founder", "Co-CEO"). Normalized non-joint titles (i.e., roles) held by more than one person at the same company represent transitions, but these only enter into our analysis if we can determine the date of the transition(s) by knowing the join dates of all occupants of that role.[2]

We then create a dummy variable to indicate whether not a firm had at least one executive role transition in that month. It is rare for a firm to have more than one executive role transition in a month, so we discard counts of multiple transitions. Likewise, in collapsing these events to the month level we discard information regarding the nature of the role or the person. The monthly data is next collapsed to the nearest previous financing event, so we can better measure firm-level time varying observables. For the executive characteristics analysis, this data is then expanded to the person-financing level as described above. This sample includes over 48,000 executives in 11,786 entrepreneurial firms.

Explanatory variable: "living dead"

[2] An exception to this is if the role is CEO, and one of those holding the role is missing a join date, which we assume to be the founding of the company. We assume that all other executive roles might not have been established at founding.

The goal of the living dead measure is to capture an entrepreneurial firm's inability to raise capital, reach milestones or grow at a high rate. A strong measure of success for VC-backed entrepreneurial firms is the rate of capital raises over time and the growth in the capital level (e.g. see Korteweg and Sorensen (2010)). The time from a firm's last financing to the next forms the basis of our proxy. A firm is in a living dead state if the time between these financings exceeds the 90th percentile of the same time for firms in the previous five years that are in the same industry, development stage and capital stock size. In particular, we estimate the distribution of time to next financing or exit for all firms in biotech between 1999 and 2004 who raised below the median capital raised for all similar early stage firms. The 90th percentile of this distribution is the living dead threshold for all early-stage biotech firms who raised capital in 2005. Thus, the variable is forward-looking from the perspective of the financing date, but reveals whether the firm appeared living dead during the post-financing period. Finally, a financing event is "Formerly living dead" if it follows a financing that was in the state and the current financing never enters that state.

Table 4 confirms that the "living dead" variable captures a meaningful phenomenon. On the one hand, firms that ever entered the living dead state IPO at a 23% lower rate and fail at a 30% higher rate. Living dead status effectively requires some investor to re-invest in the firm at some later date, so we see that both total capital raised and total financing rounds is higher in such firms. Interestingly, firms headquartered outside of the main VC center of California are 15% more likely to be living dead. All these differences imply that we must control for a host of firm and time characteristics in any regressions discussed below.

Control variables

We measure VC quality with the log of total investment made in each time period. It has been shown in many contexts (e.g. Kaplan and Schoar (2005)) that investor experience is an important correlate with quality and success. As an entrepreneurial firm raises capital in multiple financings, we track to the total capital raised. The age of the entrepreneurial firm is the difference between the founding date and each financing event.[3]

Management transitions are likely related to both entrepreneurial firm characteristics and the macroeconomic environment. There are three variables used to capture the latter. First, ``Total VC invested previous year'' sums the total capital invested in all entrepreneurial firms in the previous 12 months prior to a financing event. Gompers and Lerner (2000) find that inflows to the venture capital market correlated with deal characteristics. The initial public offering (IPO) is the goal of most VCs and entrepreneurs and rate of such exits signals the health of the market and prospects for entrepreneurial firms. The variable "Total IPOs previous year" counts the number of these exits in the previous year. Next, we construct a similar measure of the health of the market with the "S&P 500 return" that measures the return on a buy-and-hold portfolio in the year prior to the financing event.

Several executive-level characteristics are available in the data. The first includes the title of the individual, such as CEO, CTO or vice president. We also use the founder identification detailed in Ewens and Fons-Rosen (2013) to label founder or co-founders. We also observe the work histories within the VC market for all executives; so can construct startup experience measures and whether an executive is connected to one of the current firms' investors. The variable

[3] If the founding date is missing, then it is set to the date of the first VC financing.

``Time at firm'' measures the number of quarters since the executive joined the firm measured at each subsequent financing event.

Results

The first part of the analysis investigates the basic timing of management transitions and its relationship to major market movements. Figure 1 first shows how transitions vary from 1987 to 2012. The y-axis shows the fraction of all active firms – total firms that raised capital in previous three years – that have a transition in the current quarter. Several patterns emerge. First, the transition rate increases dramatically during the run-up of the dot-com boom of 1998 – 2000. Such a fact is entirely consistent with the professionalization strategies of VCs. It is also consistent with transitions simply increasing because labor markets are active in hot markets. Second, the transition rate is effectively unchanged in the subsequent downturn of 2000 – 2003. Finally, a stark seasonality is visible as transition rates are higher in the first and last quarters of the year. We thus have to control for both year and quarter fixed effects throughout the analysis.

Figure 2 next reports the level of transitions against the number of IPOs completed in each quarter. Again, a similar pattern emerges as in Figure 1 where transitions rise with increases and decreases in IPO activity. Figures 3 and 4 present the probabilities of transitions from the firm's first financing event and the last financing event. The typical firm has their first transition three years after their first investment, while transitions can occur up to 10 years afterwards. Figure 4 asks a similar question, but for all transitions and relative to each financing event. Approximately 50% of transitions occur within a year of a financing event, suggesting that investors generally drive executive role transitions. Finally, Figure 5 shows that the second and third financings have the higher probability of being the financing nearest a firm's first

management transition. Now that we have a basic understanding of the dynamics of management transitions, we investigate them in a regression setting.

Firm-level analysis

We begin with a cross-section analysis that estimates firm- and financing-level characteristics predict transitions. We are particularly interested in whether a state of living dead can predict transitions. The main limitation of this analysis is the "control" set of firms. One does not observe whether an entrepreneurial firm could have had or considered a management transition, so we restrict the sample and introduce a large set of controls. The sample restriction considers only firms that have at least two financings events, so there is ample time for a transition. The controls include all the variables discussed above and a large set of fixed effects. Fixed effects for industry, financing year, financing quarter, headquarter region and round number help address a myriad of alternative explanations. For example, the round number fixed effects ensure that we compare firms' propensity for transitions within the same development stage.

Table 5 presents the results of logistic regressions across several specifications. Recall that ``Is living dead" is equal to one if the financing ever entered the living dead state. Column (1) implies that firms in the living dead state are 60% more likely to have a transition, while column (2) implies an even larger 75% increase. Importantly, these results are conditioned on the year of the investment, stage of the firm and industry. Further, the control for IPOs in the previous year consistently has a large negative coefficient, suggesting that hotter markets have relatively few transitions than colder markets. Next, columns (3) and (4) ask whether financings that follow the exit out of living dead have relatively fewer transitions. One can imagine that any reorganization

results in increased stability. The coefficient on the variable of interest is negative, but not robust to controls.

The regressions above also include a control for the average experience of the entrepreneurial firm's VC syndicate with "VC total investments (log)." The positive and statistically significant coefficient implies that one standard deviation increase in VC experience results in a 13% increase in the transition rate. All else equal, more experienced and likely successful VCs induce more management transitions. All the remaining controls and their coefficient estimates are in line with transitions occurring in older, more developed firms.

The cross-sectional analysis is suggestive but cannot rule out simple explanations of entrepreneurial firm unobserved heterogeneity. For example, low quality founders could be poor judges of management quality, leading to increased transition and poor prospects for future financings. In contrast, the professionalization of firms that successfully reach IPO have both high transition rates and lower probabilities of living dead states. An entrepreneurial firm fixed effect analysis can rule out a large set of such alternative explanations. Here, we can only consider firms that have at least one transition and ask instead what within-firm features predict a switch in management. Moreover, the limited dependent variable setting requires that firms also exit and enter the living dead state at least once (i.e. a conditional logit requirement). Thus, we investigate what changes in firm financing characteristics and lifecycle dynamics predict management transitions. Table 6 presents the results.

To provide a benchmark on the sample, we start with a cross-section analysis of the set of firms with at least one transition in Columns (1), (2), (5) and (6). As in Table 5, the living dead state is positively related to management transitions. However, we see that in this sample the power of

the IPO market indicator is weaker and statistically insignificant. Columns (3) and (4) introduce entrepreneurial fixed effects. The sample in column (4) reduces to 2721 firms because of multicollinearity issues and some missing controls. Again, the coefficient on the living dead variable is positive and statistically significant. The implied marginal effect is a 27% increase in the probability of a transition when the firm enters the living dead state. Again, the formerly living dead variable coefficient is consistently negative, but insignificant after introducing controls. Combined with the cross-sectional analysis, these results show that the management of firms that enter the living-dead state faces a significantly higher risk of being replaced. The implied correlations cannot be explained by unobserved management quality or firm quality. We next address how these correlations relate to executive-level characteristics.

Executive-level observables

Table 8 presents the main analysis of the executive characteristics and transitions. Recall that we first gather the start and exit dates of each executive, and then match these to the nearest financing event. For non-replaced executives, their last date at the firm is either an exit date or the end of the sample. The dependent variable is an indicator equal to one if the executive was replaced at a financing or immediately prior to the subsequent financing. The empirical models are all linear probability, however, standard probit analysis produces similar results. Finally, the sample of entrepreneurial firms includes those founded in 1990-2007 and who had at least two financing events.

Column 1 reports the estimates from a model without fixed effects for financing year, industry, state and join year. The main variables of interest are executive title – CEO, CXO and VP – along with "Time at firm." The excluded category of titles includes managers, chairman and other firm-specific titles. Comparing the coefficient estimates among the included

titles along with founders we see a stark pattern. Founders are the least likely to be replaced, while transitions occur top-down otherwise. An executive's tenure attenuates transitions, while firms with revenues or profits have lower executive transitions overall. Column 2 introduces a host of fixed effects, with no changes in results.

Column 3 of Table 8 introduces the living dead variable. Here, we ask whether an executive whose tenure overlaps such states has a different propensity of being replaced. As found in the cross-sectional and FE analysis, transitions occur at a much higher rate in living dead states. The introduction of this time-varying control has no impact on the conclusions of the first two columns. These results complement those of Kaplan et. al. (2009) to show that management transitions observed in IPO'd firms are likely lower bounds for the average transition rate at the VC-backed entrepreneurial firm. Column 4 introduces interactions with living dead and executive times (e.g. "Founder X living dead"). The coefficients on these terms make clear that both living dead states increase executive transition rates and the order of such transitions – CEO first, founder last – is maintained.

The final two columns in Table 8 introduce two additional executive observables: a dummy for previous startup experience ("Previous VC exp.?") and a dummy for connections to current investors ("Worked with VCs"). Only the former consistently predicts higher transition rates than the excluded category, here the set of de novo executives. This result implies that, perhaps counter intuitively, more experienced investors are at a higher risk of replacement. The current model cannot disentangle potential mechanisms such as a match between such executives and firm type or better outside options. Again, the interactions with the living dead variable imply the transition rates for experiences individuals (and weakly for connected executives)

increase in living dead states. Overall, we conclude that connections and tenure have no additional benefit of protecting an executive's position.

Table 9 presents a preliminary robustness test of whether the results above are driven by entrepreneurial firm or manager type. Here, we divide the sample by the entrepreneurial firm's eventual outcome: IPO, failure or acquisition. The first subsample "IPO" extends the Kaplan et. al. (2009) sample to a large, representative set of firms and managers. We see that the order of replacement and the increased transition rates for eventually successful firms mimics the full sample results. Although an imperfect comparison, the coefficients across exit outcomes reveals that transitions are relatively *less* likely in IPO firms. We infer from this results that the conclusions of Kaplan et. al. (2009) provide a lower bound on transition rates for VC-backed entrepreneurial firms. However, founders are in fact relatively more at risk of replacement in eventually public firms than in the full sample. Finally, the consistent pattern across exit types alleviates concerns about massive unobserved heterogeneity.

Conclusion and further work

The transition and replacement of top-level management in high-growth entrepreneurial firms is over 60% higher when these firms enter what we call the "living dead" state. Here, the firm may struggle to raise new capital, reach internal milestones or tap the right market. In Kaplan et. Al. (2009) "jockey or horse" dichotomy, we again see that investors stick with the company and change management. The executive-level analysis, particularly that of rank, tenure and living dead state, show an increasing transition rate in bad states of the world. The typical investor appears to replace top down, with the exception of founder. The ``stickiness" of the founder in the transitions highlights investors' preference for firm and person. Perhaps surprisingly, managers who are closely tied to investors in the firm through past investments are no more at

risk or no more safe than unconnected managers. Additional work continues on pinning down executive-level transitions and their relation to investors' time-varying observables along with refining the empirical model of such transitions.

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Figure 1: Fraction of firms with transitions

Note: Figure reports the fraction of all active firms – not exited lagged by six months – that had a management transition of any type during the quarter.

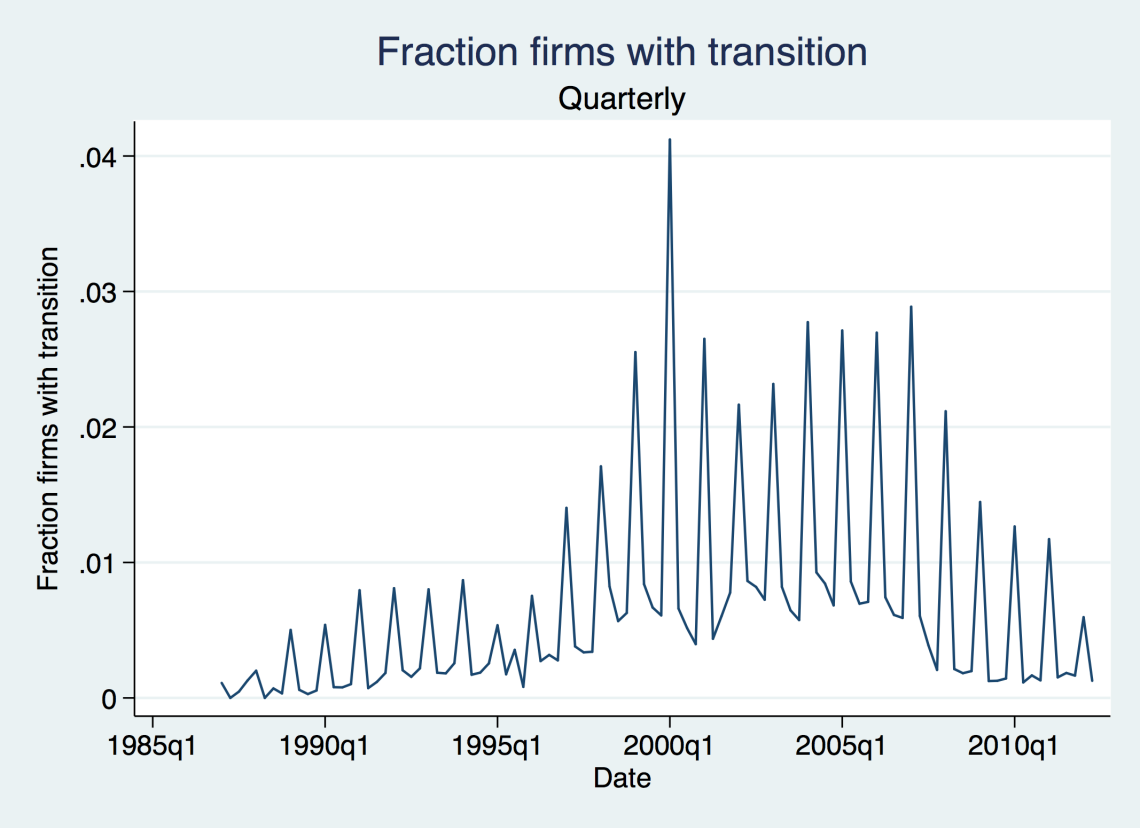


Figure 2: Management transitions and IPOs

Note: Figure reports the total number of management transitions by quarter and the number of VC-backed IPOs in the quarter.

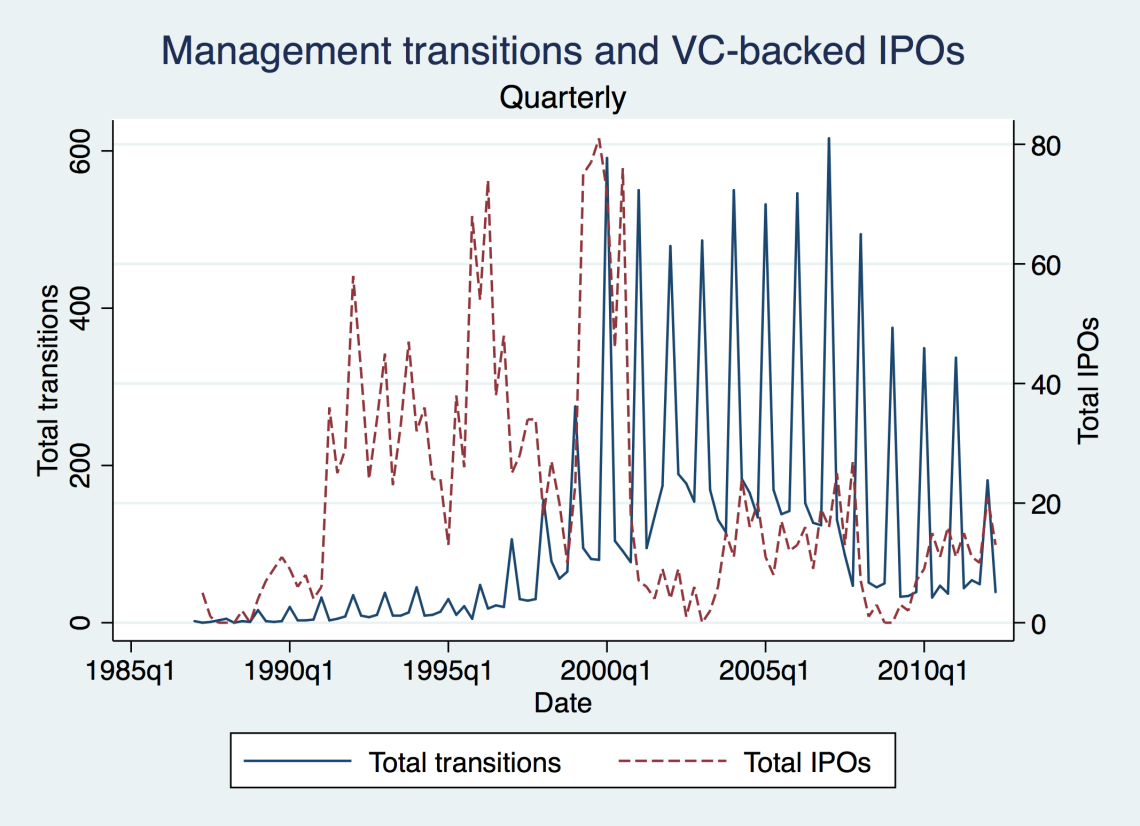


Figure 3: Hazard function of time to transition: from first VC

Note: Figure reports empirical "hazard" of transitions from the first infusion of VC to the first management transition.

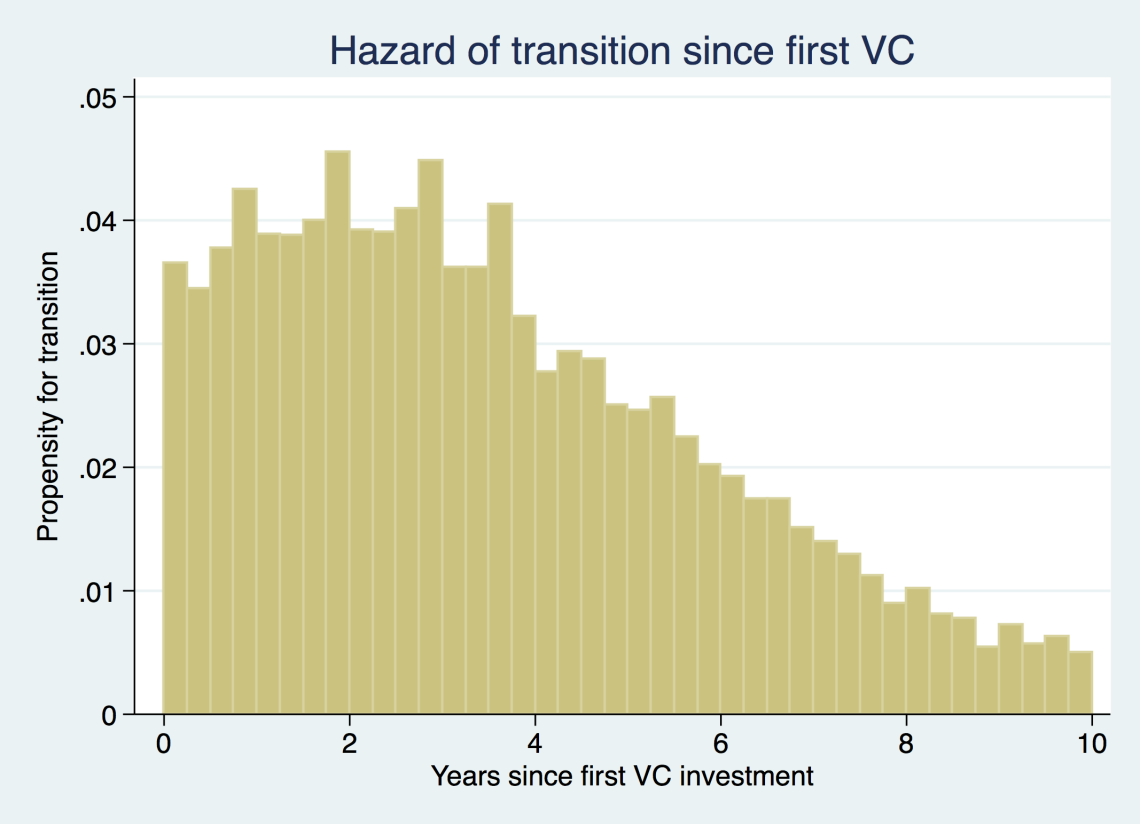


Figure 4: Hazard function of time to transition: from last VC

Note: Figure reports empirical "hazard" of transitions from the immediately prior infusion of VC to any management transition.

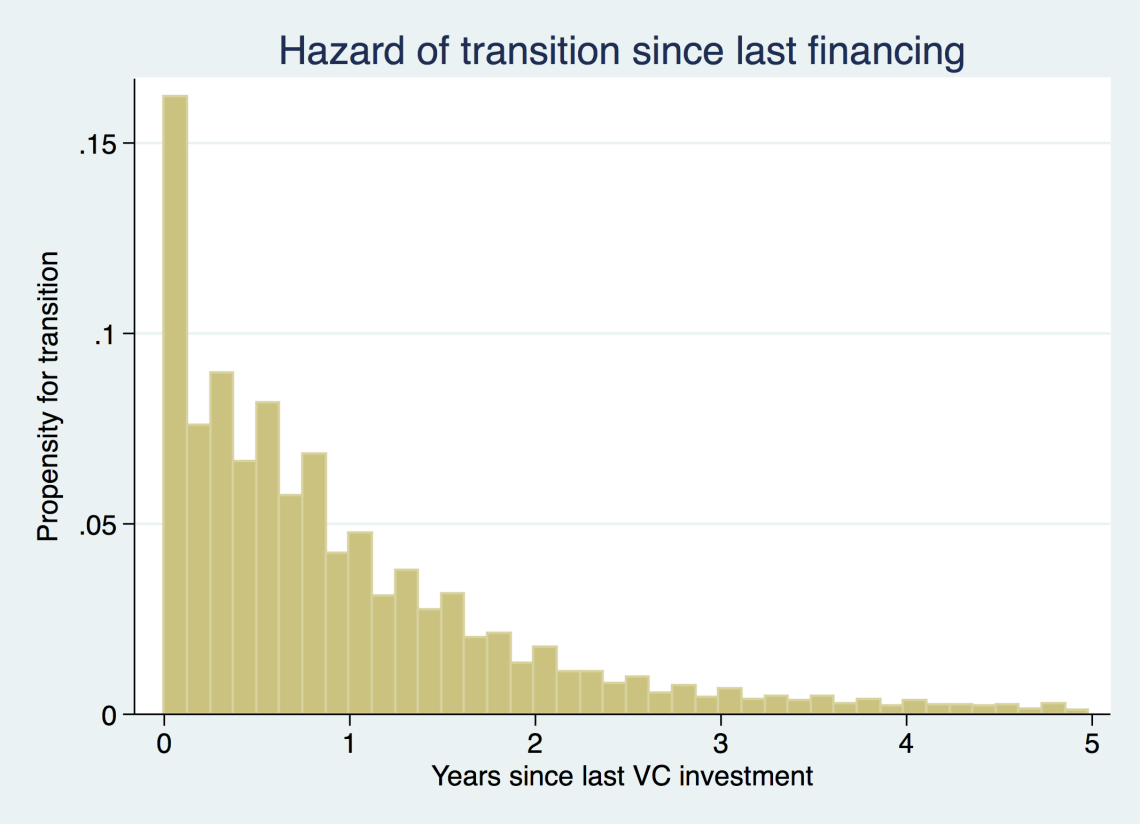


Figure 5: Hazard function of time to transition: round number

Note: Figure reports the distribution of round numbers for all transitions. Smaller round numbers are for early stage financings.

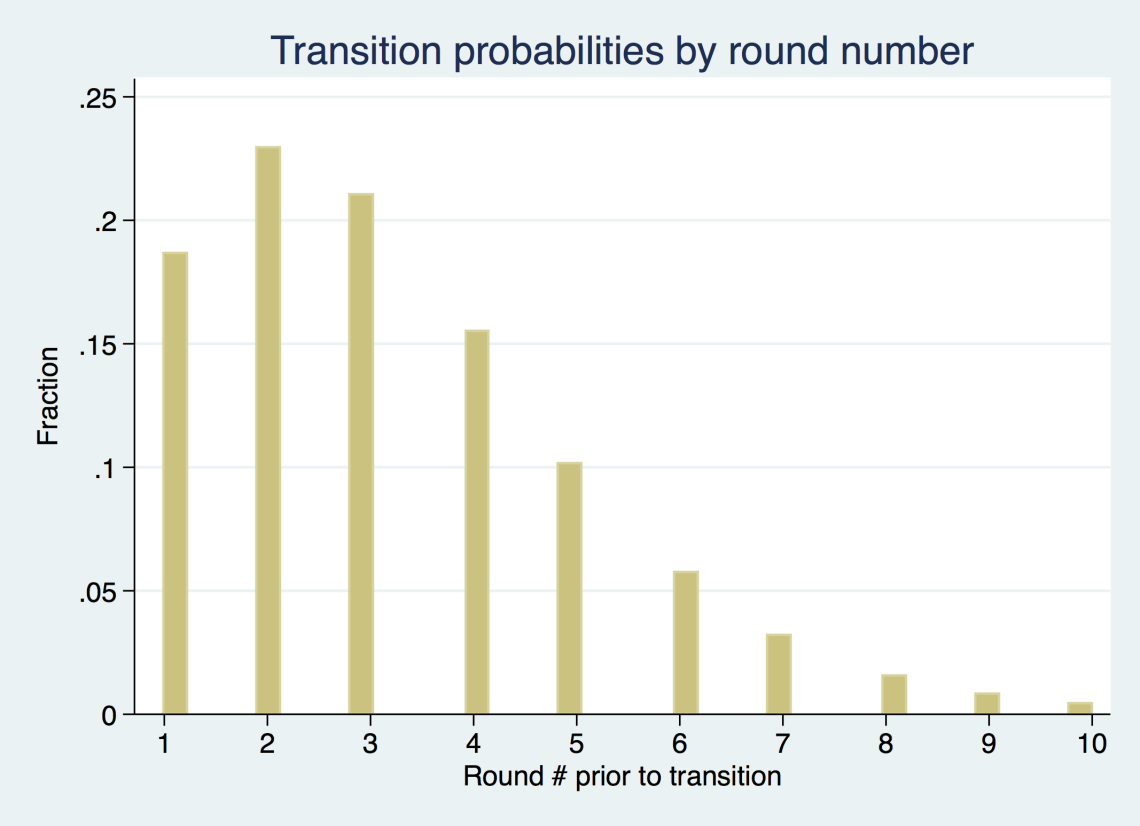


Figure 6: Survivor function of time to transition: from last VC

Note: Figure reports the fraction of firms that have had a transition by each year since the last VC financing (for all firms with at least one transition after their first round).

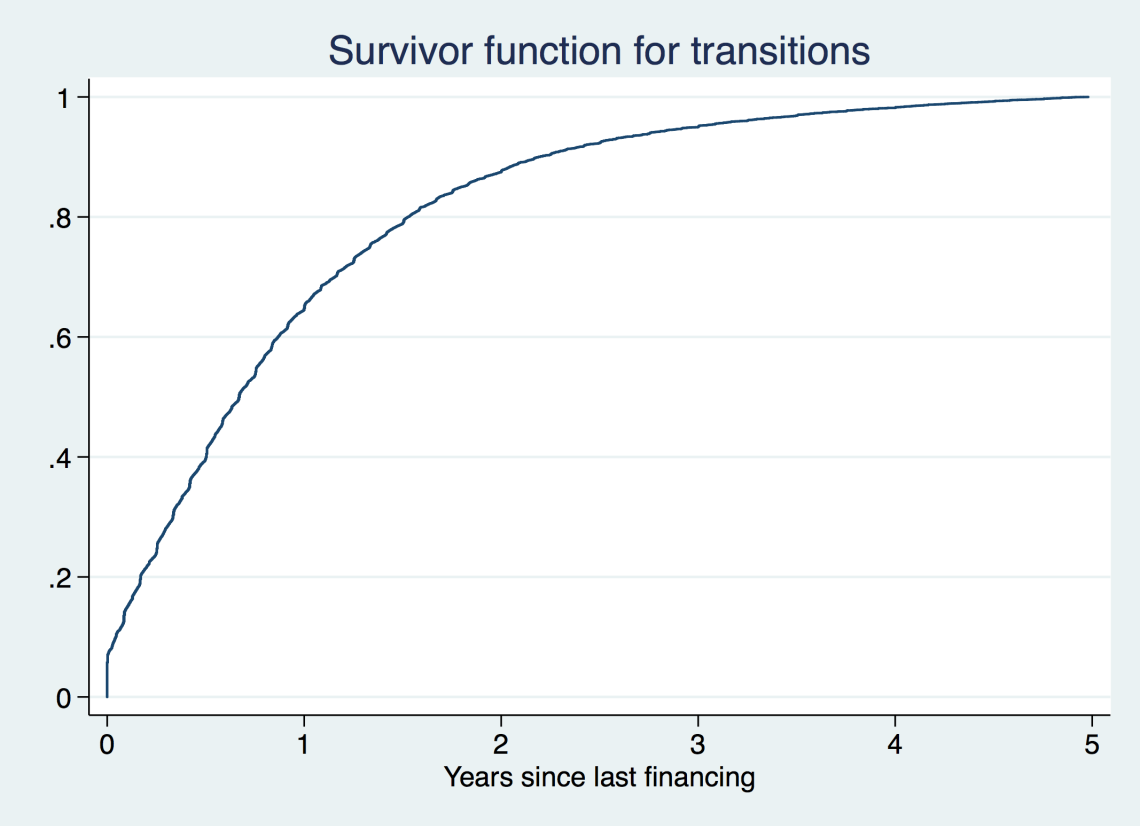


Table 1: Variable description

Note: Description of the variables used in the summary statistics and regression analysis.

IPO	A dummy variable equal to one if the entrepreneurial firm exited via an initial public offering by the end of the sample period (2012).
Acq.	A dummy variable equal to one if the entrepreneurial firm exited via an acquisition or merger by the end of the sample period (2012).
Private	A dummy variable equal to one if the entrepreneurial firm remains private as of the end of the sample (2012).
Failed	A dummy variable equal to one if the entrepreneurial firm failed by the end of the sample (2012).
Founding year	The founding year of the entrepreneurial firm, set to the year of first VC financing if unknown.
Biotech	A dummy variable equal to one if the entrepreneurial firm's industry is healthcare or biotechnology.
IT	A dummy variable equal to one if the entrepreneurial firm's industry is information technology.
First capital raised	The total capital raised in the first first VC financing.
Total raised	Total capital raised by an entrepreneurial firm across all its financing events.
Total rounds	Total financing rounds with VC for the entrepreneurial firm.
Is living dead	A dummy variable equal to one if the entrepreneurial firm's financing event took longer than similar financings in the same industry, stage and capital amount over the previous five years (top 10%).
Formerly living dead	A dummy variable indicating whether a VC financing follows a previously living dead financing (and exits).
Positive emp. growth	A dummy for positive growth in employment over year after the financing event.
Negative emp. growth	A dummy for negative growth in employment over year after the financing event.
VC total investments (log)	The average number of investments made by all syndicate members as of financing event (logged). This is an experience measure.
Age of firm	Age of entrepreneurial firm at a financing event in years since firm founding .
Total VC invested previous year	Total capital raised in VC in the prior year in all entrepreneurial firms.
Total IPOs in previous year	Total IPO events of VC-backed firms over the previous year.
Return on S&P 500	Annual return for a buy-and-hold strategy of the S&P 500 over the year prior to the VC financing.
Founder	Dummy for whether the individual is a firm founder
Previous VC experience	Dummy for whether the executive previously worked at another VC-backed firm.
Worked with VC	Dummy for whether the executive with past experience also worked with one of the VCs invested in the current firm.
# active investors	Count of total investors in all current and past syndicates.
Revenues or profits?	Dummy for whether the firm has revenues or profits in the current financing.

Table 2: Comparison of firms with transitions: known and unknown dates

Note: Table report means, differences and two-sided t-statistic p-values for two sub-samples. "Unknown date" are management transitions where we observe two unique individuals with the same title, but we cannot determine when each joined the firm. The column "Known date" includes the set of firms for which we can date at least one of the individuals, and thus the transition itself. Table reports entrepreneurial firm characteristics as defined in Table 1.

	Unknown date	Known date	Diff/s.e.
IPO	0.0869	0.110	-0.0233**
			0.00807
Acq.	0.340	0.380	-0.0408**
			0.0127
Private	0.244	0.306	-0.0622***
			0.0119
Failed	0.303	0.170	0.134***
			0.0104
CA	0.375	0.415	-0.0402**
			0.0129
MA	0.0961	0.121	-0.0248**
			0.00841
TX	0.0502	0.0581	-0.00790
			0.00607
NY	0.0664	0.0497	0.0167**
			0.00591
Founding year	1997.0	1997.9	-0.838***
			0.168
Biotech	0.200	0.192	0.00783
			0.0104
IT	0.509	0.573	-0.0643***
			0.0130
First capital	6.255	7.108	-0.853
			0.457
Total Raised	24.59	49.47	-24.88***
			3.737
Total rounds	3.272	4.476	-1.204***
			0.0623
Exit valuation	$118m	$229m	-$111.05
			59.33
Unique firms	1,943	6,729	8,672

Table 3: Firms with and without transitions

Note: Table report means, differences and two-sided t-statistic p-values for two sub-samples. "Had transitions" are firms with at least two rounds of financing that had at least one management transition. The column "No transition" includes firms with at least two rounds of funding that did not have a management transition by the end of the sample. We only consider firms founded prior to 2009. Table reports entrepreneurial firm characteristics as defined in Table 1.

	Had transition	No transition	Diff/s.e.
IPO	0.122	0.0863	0.0355***
			0.00487
Acq.	0.405	0.303	0.102***
			0.00778
Private	0.280	0.354	-0.0738***
			0.00786
Failed	0.154	0.240	-0.0856***
			0.00688
CA	0.437	0.372	0.0656***
			0.00810
MA	0.124	0.0981	0.0262***
			0.00509
TX	0.0588	0.0487	0.0101**
			0.00367
NY	0.0417	0.0615	-0.0198***
			0.00386
Founding year	1997.6	1998.2	-0.603***
			0.122
Biotech	0.202	0.217	-0.0153*
			0.00683
IT	0.576	0.492	0.0844***
			0.00831
First capital	5.866	6.081	-0.215
			0.241
Total Raised	58.26	22.08	36.19***
			1.746
Total rounds	5.172	2.782	2.390***
			0.0338
Exit valuation	$235m	$112m	$122.34***
			26.85
Unique firms	3551	18361	21912

Table 4: Difference in firms with and without "living dead"

Note: Table report means, differences and two-sided t-statistic p-values for two sub-samples. "Ever living dead" are firms that had at least one instance of a "living dead" scenario as discussed in Section X (relatively long time between financing events). The column "Never living dead" includes firms with at least two rounds of funding never entered the living dead state. We only consider firms founded prior to 2009. Table reports entrepreneurial firm characteristics as defined in Table 1.

	Ever living dead	Never living dead	Diff/s.e.
IPO	0.0765	0.0999	-0.0235***
			0.00464
Acq.	0.377	0.309	0.0680***
			0.00746
Private	0.256	0.366	-0.110***
			0.00749
Failed	0.265	0.205	0.0604***
			0.00659
CA	0.356	0.398	-0.0415***
			0.00775
MA	0.113	0.101	0.0118*
			0.00487
TX	0.0548	0.0496	0.00517
			0.00350
NY	0.0523	0.0586	-0.00622
			0.00369
Founding year	1995.7	1998.9	-3.204***
			0.114
Biotech	0.240	0.204	0.0359***
			0.00653
IT	0.518	0.509	0.00966
			0.00796
First capital	5.695	6.086	-0.391
			0.226
Total Raised	32.53	29.63	2.904
			1.686
Total rounds	3.632	3.228	0.404***
			0.0359
Exit valulation	$82.3m	$167m	-$84.7***
			$25.33
Unique firms	5670	16105	21775

Table 5: Cross-section management transitions

Notes: Cross-sectional regressions with the dependent variable "Had transition" that is equal to one if an entrepreneurial firm had at least one management transition. An observation is a financing event of an entrepreneurial firm. A firm is at risk for a transition if it was founded prior to 2009 and had at least two financings events. Variables are as described in Table 1. All regressions are logit with standard errors clustered at the entrepreneurial firm. "Year FE" are fixed effects for the financing year and quarter, "Industry FE" are fixed effects for the four major VentureSource industry classifications, "Round # FE" are fixed effects for the round number of the financing (max five) and "State FE" are fixed effects for CA, MA, TX, NY and all other states. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)
Is living dead	0.642***	0.631***		
	(0.0336)	(0.0367)		
Formerly living dead			-0.341***	-0.146**
			(0.0666)	(0.0715)
VC total investments (log)		0.118***		0.0972***
		(0.0125)		(0.0127)
Total capital raised (log)		0.397***		0.345***
		(0.0130)		(0.0158)
Age of firm (yrs.)		-0.00904**		0.0177***
		(0.00378)		(0.00396)
Total VC invested previous year (log)		0.174		0.205*
		(0.118)		(0.121)
Total IPOs previous year (log)		-0.116**		-0.117**
		(0.0484)		(0.0494)
Return on S&P 500 over previous year		-0.0952		-0.0138
		(0.141)		(0.144)
Observations	63505	63505	43831	43831
Pseudo R^2	0.007	0.115	0.001	0.082
Unique firms	19962	19962	15024	15024
Year/quarter FE?	N	Y	N	Y
Industry FE	N	Y	N	Y
Round # FE	N	Y	N	Y
State FE?	N	Y	N	Y

Table 6: Within-firm management transitions

Notes: Cross-sectional regressions with the dependent variable "Had transition" that is equal to one if an entrepreneurial firm had at least one management transition. An observation is a financing event of an entrepreneurial firm. The sample only includes firms with at least one transition after their first financing. A firm is at risk for a transition if it was founded prior to 2009 and had at least two financings events. Variables are as described in Table 1. Columns (1), (2), (5) and (6) are logit regressions. The remaining columns include entrepreneurial firm fixed effects with the conditional logit specification. "Year/quarter FE" are fixed effects for the financing year and quarter, "Industry FE" are fixed effects for the four major VentureSource industry classifications, "Round # FE" are fixed effects for the round number of the financing (max five) and "State FE" are fixed effects for CA, MA, TX, NY and all other states. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Is living dead	0.721***	0.786***	0.792***	0.901***				
	(0.0355)	(0.0393)	(0.0567)	(0.0644)				
Formerly living dead					-0.422***	-0.273***	-0.640***	-0.185*
					(0.0733)	(0.0772)	(0.0836)	(0.0962)
VC total investments (log)		0.0870***		0.0826***		0.0769***		0.0701***
		(0.0125)		(0.0199)		(0.0132)		(0.0196)
Total capital raised (log)		0.214***		0.871***		0.202***		0.793***
		(0.0150)		(0.0462)		(0.0170)		(0.0549)
Age of firm (yrs.)		-0.0252***		0.427*		0.00759*		0.288
		(0.00428)		(0.230)		(0.00401)		(0.243)
Total VC invested previous year (log)		0.240*		0.199		0.267*		0.159
		(0.133)		(0.150)		(0.137)		(0.155)
Total IPOs previous year (log)		-0.0938*		-0.131**		-0.0669		-0.128**
		(0.0537)		(0.0599)		(0.0553)		(0.0621)
Return on S&P 500 over previous year		-0.0769		0.0425		0.0228		0.101
		(0.156)		(0.172)		(0.160)		(0.177)
Observations	25630	25630	22838	22838	20012	20012	17513	17513
Pseudo R^2	0.010	0.095	0.012	0.186	0.001	0.043	0.005	0.079
Unique firms			4560	4560	5307	5307	3967	3967
Firm FE	N	N	Y	Y	N	N	Y	Y
Year/quarter FE?	N	Y	N	Y	N	Y	N	Y
Industry FE	N	Y	N	N	N	Y	N	N
Round # FE	N	Y	N	Y	N	Y	N	Y
State FE	N	Y	N	N	N	Y	N	N

Table 7: Comparison of managers with transitions: in and out of living dead

Note: Table report means, differences and two-sided t-statistic p-values for two sub-samples. "Normal" are transitions that occur outside of the living dead state, while "Left in living dead" are transitions in the living dead state. Table reports entrepreneurial firm executive characteristics as defined in Table 1.

	Normal	Left in living dead	Diff/s.e.
Replace worked with VC	0.139	0.115	0.0238*
			0.0111
Replaced time since founding	4.176	5.484	-1.308***
			0.145
Replaced joined after 2nd	0.485	0.536	-0.0512**
			0.0163
Replaced was CEO	0.188	0.175	0.0134
			0.0127
Replaced startup experience (#)	1.422	1.344	0.0780**
			0.0267
New worked with VC?	0.132	0.130	0.00195
			0.0110
New is CEO	0.186	0.175	0.0114
			0.0126
New startup experience (#)	1.403	1.367	0.0354
			0.0259
Transitions	8825	2350	11175

Table 8: Executive-level analysis of management transitions

Notes: Table reports linear probability estimates for the dependent variable equal to one if the executive was replaced at the current financing or some time prior to the subsequent. A unit of observation is the span of financings for which an executive works at an entrepreneurial firm. "Addl. controls?" include "Time at firm (qrt) squared," "VC total investments," "Number of active investors," dummies for early/mid/late-stage, "Total capital raised as of t," and "Years since last financing." "Year FE" are fixed effects for each financing year. "Industry FE" are 17 dummies for the VentureSource industry categories. "Year join FE" are the year of the executives start date dummy and "State FE" are dummies for the HQ of the entrepreneurial firm. Standard errors clustered at the entrepreneurial firm. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	(1)	(2)	(3)	(4)	(5)	(6)
Living dead?			0.0753***	0.0698***	0.0758***	0.0615***
			(0.00362)	(0.00829)	(0.00362)	(0.00375)
CEO	0.0364***	0.0356***	0.0360***	0.0312***	0.0354***	0.0355***
	(0.00140)	(0.00141)	(0.00142)	(0.00140)	(0.00142)	(0.00142)
CXO	0.0266***	0.0247***	0.0250***	0.0204***	0.0254***	0.0253***
	(0.00118)	(0.00122)	(0.00122)	(0.00120)	(0.00122)	(0.00122)
VP	0.0142***	0.0116***	0.0123***	0.00995***	0.0132***	0.0132***
	(0.00117)	(0.00119)	(0.00119)	(0.00118)	(0.00120)	(0.00120)
Firm founder?	-0.0325***	-0.0336***	-0.0336***	-0.0299***	-0.0330***	-0.0330***
	(0.00128)	(0.00132)	(0.00131)	(0.00129)	(0.00131)	(0.00131)
Founder X living dead				-0.0725***		
				(0.00716)		
CEO X living dead				0.0810***		
				(0.00868)		
CXO X living dead				0.0707***		
				(0.00737)		
VP X living dead				0.0341***		
				(0.00685)		
Time at firm X living dead				-0.0110***		
				(0.00257)		
Previous VC exp.?					0.00846***	0.00612***
					(0.00119)	(0.00116)
Worked with VCs					0.00204	0.000950
					(0.00203)	(0.00197)
Previously exec. X living dead						0.0448***
						(0.00892)
Work with VC X living dead						0.0302*
						(0.0177)
Time at firm (quarters)	0.00489***	0.00638***	0.00625***	0.00691***	0.00640***	0.00640***
	(0.000506)	(0.000579)	(0.000571)	(0.000552)	(0.000571)	(0.000571)
Firm age (log yrs)	-0.00408***	-0.00149	-0.00238**	-0.00257**	-0.00237**	-0.00239**
	(0.000995)	(0.00108)	(0.00106)	(0.00106)	(0.00106)	(0.00106)
Revenues or profits?	0.0111***	0.00695***	0.00487***	0.00477***	0.00497***	0.00508***
	(0.00126)	(0.00142)	(0.00140)	(0.00140)	(0.00140)	(0.00140)
Observations	168988	168988	168988	168988	168988	168988
R^2	0.012	0.019	0.027	0.030	0.027	0.028
Unique firms	10697	10697	10697	10697	10697	10697
Year FE?	N	Y	Y	Y	Y	Y
Industry FE?	N	Y	Y	Y	Y	Y
Year join FE?	N	Y	Y	Y	Y	Y
State FE?	N	Y	Y	Y	Y	Y
Addl. controls?	Y	Y	Y	Y	Y	Y

Table 9: Executive-level analysis of management transitions: by exit type

Notes: Table reports linear probability estimates for the dependent variable equal to one if the executive was replaced at the current financing or some time prior to the subsequent. A unit of observation is the span of financings for which an executive works at an entrepreneurial firm. Columns 3-4 consider only entrepreneurial firms that had an IPO. Columns 5-6 considers only entrepreneurial firms that eventually failed and Columns 7-8 only consider firms that eventually were acquired. Thus, the sub-samples exclude still private firms overall. "Addl. controls?" include "Time at firm (qrt) squared," "VC total investments," "Number of active investors," dummies for early/mid/late-stage, "Total capital raised as of t," and "Years since last financing." "Year FE" are fixed effects for each financing year. "Industry FE" are 17 dummies for the VentureSource industry categories. "Year join FE" are the year of the executives start date dummy and "State FE" are dummies for the HQ of the entrepreneurial firm. Variable definitions in Table **??**. Standard errors clustered at the entrepreneurial firm. Significance: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	All		IPO		Failed		Acquired	
Living dead?	0.0698***	0.0615***	0.0490**	0.0287***	0.0741***	0.0645***	0.0759***	0.0682***
	(0.00829)	(0.00375)	(0.0228)	(0.00901)	(0.0270)	(0.0111)	(0.0119)	(0.00525)
CEO	0.0312***	0.0355***	0.0117***	0.0139***	0.0331***	0.0375***	0.0319***	0.0372***
	(0.00140)	(0.00142)	(0.00248)	(0.00254)	(0.00398)	(0.00373)	(0.00227)	(0.00229)
CXO	0.0204***	0.0253***	0.0206***	0.0240***	0.0190***	0.0199***	0.0207***	0.0270***
	(0.00120)	(0.00122)	(0.00253)	(0.00263)	(0.00365)	(0.00321)	(0.00191)	(0.00194)
VP	0.00995***	0.0132***	0.00882***	0.0108***	0.0170***	0.0178***	0.0126***	0.0170***
	(0.00118)	(0.00120)	(0.00218)	(0.00222)	(0.00377)	(0.00340)	(0.00194)	(0.00193)
Firm founder?	-0.0299***	-0.0330***	-0.0125***	-0.0141***	-0.0265***	-0.0294***	-0.0324***	-0.0362***
	(0.00129)	(0.00131)	(0.00224)	(0.00230)	(0.00375)	(0.00339)	(0.00201)	(0.00205)
Founder X living dead	-0.0725***		-0.0523**		-0.0875***		-0.0703***	
	(0.00716)		(0.0249)		(0.0244)		(0.0103)	
CEO X living dead	0.0810***		0.0812***		0.0805***		0.0767***	
	(0.00868)		(0.0243)		(0.0299)		(0.0120)	
CXO X living dead	0.0707***		0.110***		0.0632***		0.0677***	
	(0.00737)		(0.0265)		(0.0224)		(0.0102)	
VP X living dead	0.0341***		0.0416**		0.0183		0.0391***	
	(0.00685)		(0.0189)		(0.0219)		(0.00964)	
Time at firm X living dead	-0.0110***		-0.0142		-0.00666		-0.0124***	
	(0.00257)		(0.00905)		(0.00884)		(0.00372)	
Previous VC exp.?		0.00612***		0.00733***		0.00596**		0.00438**
		(0.00116)		(0.00197)		(0.00287)		(0.00184)
Worked with VCs		0.000950		-0.000244		0.00263		0.00130
		(0.00197)		(0.00314)		(0.00498)		(0.00311)
Previously exec. X living dead		0.0448***		0.129***		0.000181		0.0378***
		(0.00892)		(0.0325)		(0.0224)		(0.0119)
Work with VC X living dead		0.0302*		-0.00342		0.0142		0.0382
		(0.0177)		(0.0485)		(0.0493)		(0.0258)
Time at firm (quarters)	0.00691***	0.00640***	0.00324***	0.00316***	0.0105***	0.0103***	0.00691***	0.00595***
	(0.000552)	(0.000571)	(0.00109)	(0.00113)	(0.00148)	(0.00139)	(0.000949)	(0.000979)
Firm age (log yrs)	-0.00257**	-0.00239**	-0.00279	-0.00281	-0.00403	-0.00478**	-0.00357**	-0.00316*
	(0.00106)	(0.00106)	(0.00190)	(0.00189)	(0.00249)	(0.00234)	(0.00179)	(0.00179)
Revenues or profits?	0.00477***	0.00508***	0.00739***	0.00769***	-0.00376	0.000650	0.00657***	0.00681***
	(0.00140)	(0.00140)	(0.00264)	(0.00266)	(0.00358)	(0.00329)	(0.00247)	(0.00247)
Observations	168988	168988	30361	30361	19644	25331	73298	73298
R^2	0.030	0.028	0.025	0.028	0.027	0.025	0.036	0.034
Unique firms	10697	10697	1106	1106	1952	2288	4371	4371
Year FE?	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE?	Y	Y	Y	Y	Y	Y	Y	Y
Year join FE?	Y	Y	Y	Y	Y	Y	Y	Y
Addl. controls?	Y	Y	Y	Y	Y	Y	Y	Y