Investor Horizon and the Life Cycle of Innovative Firms: Evidence from Venture Capital

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Abstract

I explore whether the contractually fixed horizon of venture capital funds affects their investments in innovative firms. I identify the effect of horizon on investment decisions with between- and within-fund variations in fund age. Long-horizon funds select young companies at an early stage of their development, which grow their patent stock significantly more than companies funded by short-horizon funds. The sensitivity of investment decisions to horizon is weaker in hot markets, and stronger for more experienced investors. As a result, venture capital funding goes to more mature companies in times when the average fund horizon is shorter, and in industries with longer life cycles.

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Introduction

Entrepreneurial firms are key contributers to long-term growth. Yet because innovation is characterized by significant informational frictions, financing the growth of these firms is challenging. Venture Capital (VC) has proved to be a successful model to fund disruptive entrepreneurial firms: while relatively few companies receive VC funding, a majority of initial public offerings (IPOs) in the U.S. are VC-backed (Kaplan and Lerner, 2010). Despite the economic importance of VC funds, however, questions remain about their organization and how it affects their ability to nurture the development of innovative companies.

One distinguishing feature of VC funds is their limited investment horizon. These funds generally have an investment lifetime of ten years which is fixed *ex ante*, in contrast to most financial intermediaries. Funds are raised in year 0 from outside investors - "Limited Partners" (LPs) - and trusted to fund managers - "General Partners" (GPs), who invest and return funds and capital gains to LPs within ten years. Virtually all funds share this contractual structure, which balances the need for the GP to have a sufficiently long investment horizon, with the need for the LPs to avoid being held up by the GP once they have committed to invest.[1]

This paper studies whether the horizon of VC funds affects their decisions to invest in more or less mature companies. In principle, funds' limited horizon should not affect GPs investment decisions. The maturity of liabilities is irrelevant for the choice of the maturity of assets on a fund's balance sheet (Modigliani and Miller, 1958). Frictionless capital markets effectively allow investors to transfer wealth through time. Even when assets mature later than liabilities, investors can sell them at fair value before maturity. Therefore, in the absence of friction, variations in investors' horizon are unrelated to the maturity of projects they select. However, horizon may affect investment decisions if there are large information asymmetries between initial investors and prospective buyers of an innovative firm, and if theses asymmetries are time-varying. If the information gap between insiders and outsiders is gradually bridged through time, as the company's outcomes become observable, then the timing of exit becomes crucial, and the horizon of initial investors might affect their investment decisions ex ante.

[1]See Sahlman (1990); Gompers and Lerner (1996); Gompers (1996); Gompers and Lerner (1999); Lerner and Schoar (2004); Cheffins and Armour (2007); Metrick and Yasuda (2009); Masulis and Thomas (2009); and Harris (2010). While this paper focuses mostly on venture capital funds, buyout funds share the same contractual structure.

To test this idea and its implications, I assemble a large sample of VC investments involving 3,435 funds from 1980 to 2010. I compare the behavior of funds with heterogeneous investment horizons, as well as the evolution of a given fund's behavior as it moves closer to the end of its investment life. More specifically, I ask whether the variations in funds' investment horizon predict the maturity of the companies they provide funding to. I measure the maturity of companies by their age, their development stage, the number of prior rounds of financing they have received, and their patenting behavior. Consistent with the idea is that companies at an early stage of their development take longer to be exited, I confirm that less mature companies along these dimensions are indeed held for a longer period of time until they are successful sold by VC funds through an IPO or a trade sale.

I find strong evidence that funds with longer horizon invest in younger firms. Univariate tests show that with respect to funds within their first three years of operations, older funds select companies that are 3.5 years older, that have already received 0.5 more prior rounds of financing, and that have a 9% smaller probability to be at the seed or early stage of their development. Multivariate specifications controlling for confounding factors confirm the robust and highly significant relationship between the age of the fund and the maturity of its targets. A one standard deviation increase in the age of the fund leads to an increase in the maturity of targeted companies by 8 to 16%. It reduces the probability that the fund invests in a company that already applied for a patent in the past by 5 to 13%. I run similar tests on a sample of investments made by corporate venture and evergreen funds, which are typically not constrained by an investment horizon,[2] and I find no effect of fund age on the maturity of investments.

In addition to these ex ante differences, the data shows that the patenting dynamics of companies receiving funding by long- and short-horizon VC funds differ substantially. A one standard deviation increase in the age of the fund leads to a 17 to 25% larger growth in patent count around the investment. The number of citations per patent also increases more for companies receiving funding by a long-term fund, which indicates that the increase in patent count is not achieved at the expense of the quality of these patents. These results could reflect the fact that long-horizon VC funds invest in companies with a greater innovative activity. They could also reflect that these funds select firms

[2] Corporate venture funds are typically structured as subsidiaries of corporations, and Evergreen funds typically return any proceeds from sales of investments or dividends back to the fund rather than making distributions to its investors.

at an earlier stage of their development, when they are still growing their patent stock at a higher pace. Both of these non-exclusive interpretations confirm that variation in funds' horizon predict sharp variations in investment decisions.

I show that the propensity of short-horizon funds to select more mature companies varies substantially in the timeseries, and in the cross-section of funds. I first ask whether horizon matters more or less in hot markets, when the appetite of investors for innovation increases. I find indeed that the sensitivity of investment choices to horizon decreases when past returns of the Nasdaq Composite Index have been abnormally high, or when the average time between firm creation and its exit through an IPO or a trade sale has gone down. This is consistent with the observation by Nanda and Rhodes-Kropf (2010, 2013) that market conditions are important determinants of the incentives to fund innovation.

I then explore whether this behavior varies in the cross-section of funds. I study whether the sensitivity of project selection to horizon is weaker for experienced GPs, such as those with the largest number of prior fundraisings or investments. Instead, I find that the sensitivity of target maturity to fund age is larger for more experienced GPs. These GPs operate a steeper shift towards less mature companies as their funds get closer to liquidation. These findings indicate that more experienced investors have a better ability to match the maturity of their assets with their fixed horizon liability structure. This ability could result from their privileged access to a wider range of investment opportunities (Hochberg, Ljungqvist, and Lu, 2007, 2010), or from the fact that more experienced VC firms run several overlapping funds, and can therefore better match the maturity of assets and liabilities in each individual fund. In any case, this finding suggests that this selection ability might be a key component of the higher performance of experienced funds (Kaplan and Schoar, 2005).

Finally, I ask whether exit patterns are consistent with time-constrained funds selecting targets with a larger probability of a successful exit. Indeed, I find that a one standard deviation in fund age is associated with a 5% (2.4 percentage points) increase in the probability of a successful exit, but this pattern is only observed among experienced investors. The results illustrate that the contractual provision between LPs and GPs that constrains investment horizon leads funds getting closer to liquidation to select investments that are mature enough to be quickly and easily exited.

These results do not imply that GPs are not acting in the interest of LPs, given the fixed horizon embedded in their contractual structure. Conditional on this contractually fixed horizon, the optimal behavior from the perspective of the LPs is to maximize returns, and thus to shift towards more mature investments, which is precisely what GPs seem to be doing, especially the most experienced ones. Hence, the need to overcome agency problems between GPs and LPs by limiting the investment horizon of VC funds leads to a second best outcome, whereby fund managers restrict their set of potential targets to more mature companies as their horizon shrinks.

In the last part of the paper, I explore the aggregate implications of these findings. First, if successive generations of VC funds overlap so that funds with long remaining horizons are available at all times to finance very young companies, then the time constraint on individual funds should not have any effect on the aggregate amount of VC funding going to early-stage firms. In practice, VC fundraising is highly cyclical. Hence, there are significant timeseries variations in the horizon of the aggregate pool of VC money available for investment (”dry powder”). As a result, in periods where the aggregate dry powder has a short maturity, aggregate VC funding is tilted towards later-stage companies. Timeseries regressions confirm that the age of companies receiving their first VC investment is strongly correlated with the average maturity of active VC funds. The results hold when controlling for the age of companies receiving their first investment by corporate venture capital or evergreen funds, who are less constrained by their horizons. A second aggregate implication is that VC funding should target more mature companies in sectors that have a structurally longer life cycle, namely a longer average time period from the business creation to its IPO or M&A. Cross-sectional regressions at the sector level indeed indicate that companies in sectors with longer life cycles are significantly older when they receive their first VC investment. While these results are only suggestive, they highlight that the pattern observed at the fund level can explain cross-sectional and timerseries variations in the type of companies that receive VC funding.

Overall, the results illustrate that agency problems between GPs and LPs, which translate into the finite investment life of VC funds, have real effects on funds' asset selection. They also provide some empirical ground for the observation common among practitioners[3] and academics,[4] that the structure of venture capital funds, and in particular their finite investment horizon, might be an

[3]See The Economist, “Has the ideas machine broken down”, January 2013.
[4]See Fagnan, Fernandez, Lo, and Stein (2013).

impediment to the funding of certain types of innovations. Consistent with the results presented in this paper, Lerner (2012) notes that because of their horizon, VC funds *"have focused on sectors such as software and social networking, which are characterized by fast innovation clock speeds"*. In a survey released in 2011, the National Venture Capital Association (NVCA, 2011) finds that close to 40% of VC firms have shifted investments away from companies researching critical therapies against cardiovascular disease, diabetes, obesity, cancer, and neurological diseases due to the length of the approval process of the Federal Drug Administration. Huggett (2012) and Huggett (2013) also find that private financing available for young, innovative, therapeutic companies has declined steadily since 2006. As a result, because the time horizon of VC is still shorter than most clinical trial cycles, earlier stages of the drug development process are hard to finance (Milken, 2012).[5] On a related note, the constraint imposed by their limited horizon on funds investments might also help explain the recent development of alternative and complementary forms of innovation financing such as corporate venture capital (Chemmanur, Loutskina, and Tian, 2011), or angel financing (Kerr, Lerner, and Schoar, 2014).

By considering the impact of funds' investment horizons, this paper relates to the literature studying the contractual structure of venture capital and private equity funds, and its real effects. While an abundant body of work has analyzed the implications of contracts between VC funds and their portfolio companies, fewer papers have considered the contracts between LPs and GPs.[6] In particular, the fixed horizon of VC partnerships has received little attention so far. Lerner and Schoar (2004) show that restrictions imposed by private equity funds on their investors are aimed at selecting liquid investors so as to invest in industries with longer cycles. Axelson, Strömberg, and Weisbach (2009) argue that by trusting private equity fund managers with the cash to be spent on a series of deals, rather than on a deal-by-deal basis, their incentives to take excessive risks are mitigated. Kandel, Leshchinskii, and Yuklea (2011) model the behavior of VC funds and find that the age of the fund should have an important effect on the tendency to continue or stop projects.[7] On the empirical side, the impact of fund age on performance metrics has been investigated in a few

[5] Budish, Roin, and Williams (2013) make a related point with the distortions induced by fixed patent terms: patent protection is too short for some critical therapies to be funded by VC funds.

[6] Recent exceptions are Chung, Sensoy, Stern, and Weisbach (2012) and Hochberg, Ljungqvist, and Vissing-Jorgensen (2014) who analyze the compensation structure of GPs and its implications.

[7] While they theoretically study the effect of the finite horizon on continuation decisions, this paper empirically studies the effect on the finite horizon on the *ex ante* incentives to fund more or less innovative firms. In addition, they do not study whether horizon has an effect on the type of companies which receive funding and their life cycle.

papers. Masulis and Nahata (2009) find that closer to liquidation, funds sell companies cheaper. Ljungqvist, Richardson, and Wolfenzon (2008) show that younger funds invest in riskier buy-outs towards the end of their life, especially if they have underperformed earlier, in an attempt to achieve superior performance.[8] Finally, Robinson and Sensoy (2011) show that cash flow variation within private equity funds is mostly idiosyncratic and that most predictable variation is explained by the age of the fund.

This paper also builds on a recent and growing literature focusing on investor horizon and its impact on corporate policies. Bushee (1998) finds that ownership by financial institutions with a high portfolio turnover significantly increases the probability that managers reduce R&D to reverse an earnings decline. Polk and Sapienza (2009) and Derrien, Kecsks, and Thesmar (forthcoming) also use portfolio turnover as a proxy for shareholders investment horizon. They show that when firms are mispriced, the horizon of their shareholders affects their corporate policy. Cella, Ellul, and Giannetti (2013) find that institutional investors with shorter trading horizons were incited to sell their holdings to a larger extent than investors with longer horizons following Lehman Brother's bankruptcy, thereby contributing to the amplification of the market shock. Xu (2011) uses CEO employment contracts and finds that contract length is positively correlated with both capital expenditure and R&D expenses. I contribute to this literature by using the time until the liquidation of VC funds as a new proxy for investment horizon. It is plausibly more exogenous than other proxies for investor horizon since the evolution of a given fund's horizon is deterministic, and unlikely to be correlated with unobserved variables also correlated with investigated outcomes. Moreover, a distinctive feature of this approach is that it allows me to study *within investor* changes in investment horizon by using fund fixed effects.

Finally, the results presented here relate to an emerging body of theoretical and empirical literature on the relationships between corporate ownership and innovation.[9] Aghion, Van Reenen, and Zingales (2013) argue that institutional owners increase managerial incentives to innovate by

[8]Other recent papers have studied the effect of contractual incentives on the behavior of *buy-out* investors. Strömberg (2008) finds that leverage buyouts sponsored by private equity funds with more experience exit earlier, and funds that are publicly traded (and hence have an infinite investment horizon) take more time to exit their investments. Arcot, Fluck, Gaspar, and Hege (2013) and Degeorge, Martin, and Phalippou (2013) provide evidence that secondary buy-outs emerge as a response to contractual incentives.

[9]A closely related literature examines the drivers of innovation within the firm, such as compensation and incentives. See for instance: Lerner and Wulf (2007), Hellmann (2007), Hellmann and Thiele (2011), and Manso (2011).

reducing the career risk for managers to undertake risky projects. Ferreira, Manso, and Silva (2012) show that it is optimal for a firm to go public when it exploits existing ideas, and optimal to go private when it explores new ideas. In their model, private firms are less transparent to outside investors, and their owners can therefore time the market by choosing an early exit strategy if they receive bad news. Belenzon, Berkovitz, and Bolton (2009) and Belenzon and Berkovitz (2010) show that firms affiliated with business groups are more innovative than standalone firms. Seru (forthcoming) finds that firms acquired in diversifying mergers produce both a smaller number of innovations and less novel innovations. Bernstein (2011) compares the patenting activity of firms going public and firms withdrawing their IPO and finds that going public has a causal effect on the quality of innovation. In the context of private equity investments, Lerner, Sorensen, and Strömberg (2011) show that patent count does not decrease and that citation count increases when companies undergo a leveraged buy-out. In the case of venture capital, Tian and Wang (2011) show that private equity firms that have shown a high propensity to finance failed ventures in the past (and thus have a high tolerance for early failure) invest in companies that are more innovative. Chemmanur et al. (2011) show that companies held by corporate venture capitalists patent more actively than companies held by independent venture capitalists, an effect that they attribute to a difference in tolerance for early failure. Azoulay, Zivin, and Manso (2011) find that scientists produce more innovative research when they receive grants with a larger tolerance for early failure and with rewards for long-term success. Atanassov (2013) shows that anti-takeover laws stifle innovation, unless the company has alternative governance mechanisms including large shareholders and pension fund ownership. The results presented in this paper add to this literature by highlighting that the horizon of corporate investors is a key driver of their decisions to allocate their investments to more or less innovative companies.

The rest of the paper is organized as follows. Section 1 develops the hypotheses to be tested; Section 2 presents the sample and data; Section 3 presents the results; and Section 4 concludes.

1 Theoretical framework and testable hypotheses

To analyze the effect of the contractually fixed horizon of VC funds, we need to understand how it emerges in the first place. Gompers and Lerner (2001) argue that the first VC limited partnership was formed in 1958 and followed the template of other limited partnerships common at the time, such as those that had been formed to develop real estate projects and explore oil fields, and which had predetermined finite lifetimes of usually ten years.[10] While this setting is not common among financial intermediaries, finite mandates are commonplace in other contexts, such as the CEO or academic labor markets. Virtually all venture capital and private equity funds share this contractual structure, which balances the need for the GP to have a sufficiently long investment horizon, with the need for the LPs to avoid being held up by the GP once they have committed to invest. Hence, the limited fund horizon is an equilibrium outcome and is not fully exogenous to funds' investments. In particular, the relatively longer lock-in period of these funds with respect to other investment vehicles allows their manager to make illiquid investments such as buy-outs or venture investments. However, this constraint is imposed to the fund *ex ante*, and it does not vary at all across funds nor through time. Hence, changes in the time left before the liquidation of a fund, which are deterministic, are exogenous to the arrival of investment opportunities and to variations in the maturity of companies that request funding throughout the fund's life. Therefore, comparing the companies selected by a fund at different points in its investment life makes it possible to study the effect, if any, of horizon on investment decisions.

In principle, funds' limited horizon should not affect GPs investment decisions. The maturity of liabilities is irrelevant for the choice of the maturity of assets on a fund's balance sheet (Modigliani and Miller, 1958). Frictionless capital markets effectively allow investors to transfer wealth through time. Even when assets mature later than liabilities, investors can sell them at fair value before maturity. Therefore, in the absence of friction, variations in investors' horizon are unrelated to the maturity of projects they select. Short- and long-horizon investors are equally likely to fund any company, irrespective of their maturity. However, horizon may affect investment decisions if there are large information asymmetries between initial investors and prospective buyers of an innovative firm, and if these asymmetries are time-varying. If the information gap between insiders and outsiders is gradually bridged through time, as the company's outcomes become observable, then the timing of exit becomes crucial, and the horizon of initial investors might affect their investment decisions ex ante. In particular, a shorter horizon might drive them to focus on more

[10]While the incorporation of the fund as a limited partnership allows the funds investor to avoid double taxation, the partnership need not have a limited lifespan to avoid double taxation.

mature companies, that can be exited more quickly.

The fact that investment decisions might be sensitive to investor horizon could be rationalized with the idea developed in Manso (2011), and used in Ferreira et al. (2012), that the exploration of new ideas takes longer to produce observable payoffs than the exploitation of existing ones. Drawing from this framework, I present a simple model in Appendix C that shows why horizon may matter for the decision of a VC fund manager to select a more or less exploratory companies. To the extent that less mature companies are more exploratory in nature, VC funds with a shorter remaining horizon might select more mature companies. The fact that investment decisions might be sensitive to investor horizon could also be explained with the model of Chemmanur and Fulghieri (1999), which predicts that firms go public only once they have established a long enough track record that the information collection costs for outside buyers are low enough. In practice, the propensity of firms to go public increases with age (Ritter and Welch, 2002), and the IPOs of younger firms are generally more underpriced (Ljungqvist and Wilhelm, 2003). Both stories predict that two projects with similar NPV but different maturities might be of different values to a short- and a long-horizon investor. VC fund with a short horizons might thus be tilted towards investing in more mature companies.

Hypothesis 1: Funds with a longer horizon invest in less mature companies.

In hot markets, the appetite of the stock market for innovation increases (Nanda and Rhodes-Kropf, 2010, 2013). Ljungqvist, Nanda, and Singh (2006) predict that as the optimism of sentiment investors increases, more companies have an incentive to go public. Thus, if recent returns on the investment in innovative companies have been high, or if VC-backed companies have been listed earlier in their life cycle, VC funds with shorter horizon could select less mature projects in anticipation that they might be able to re-sell them quickly at lower discount. Therefore, horizon might be a less relevant driver of investment decisions in these markets.

Hypothesis 2: The sensitivity of investment decisions to horizon decreases in hot markets.

The propensity to adjust the maturity of their assets to their ten-year horizon might vary across funds. In particular, more experienced investors might have a better ability to match their assets with their fixed horizon liability structure. This ability could result from access to a wider range of projects (Hochberg et al., 2007, 2010), or from the fact that more experienced VC firms run several overlapping funds, and can therefore better match the maturity of the assets and liabilities in each of their funds.

Hypothesis 3: The sensitivity of investment decisions to horizon increases with VC investors' experience.

If successive generations of VC funds overlap so that funds with long remaining horizon are available at all times to finance early-stage companies, then the time constraint on individual funds should not have any effect on the aggregate amount of VC funding going to younger firms. In practice, VC fundraising is highly cyclical. Hence, there are significant timeseries variations in the horizon of the aggregate dry powder. As a result, in periods where the aggregate dry powder has a short maturity, aggregate VC funding might be tilted towards later-stage companies. Additionally, given that VC funds might only select companies that will be mature enough to be sold before the end of their remaining horizon, companies in industries with a structurally longer average time period from the creation to IPO or M&A, might receive their first round of VC financing at a later stage of their life cycle.

Hypothesis 4: VC funding is tilted towards later stage companies when the average fund horizon is shorter, and in sectors with longer life cycles.

2 Data and sample

I use SDC Platinum VentureXpert (henceforth "Venture Xpert" or "SDC") to test the set of hypotheses derived above. SDC provides information on venture capital and private equity investments between 1962 and 2010. For the purpose of this study, I focus on all funds raised from 1980 to 2010 labeled by SDC as "Independent Private Partnership" involved in "Venture Capital" and based in North America.[11] I restrict the sample to investments made up to 2010 in unlisted companies. I exclude all funds for which the parent VC firm is unknown, or for which SDC does not provide either the "initial closing date" or the "fund year", which enables me to identify the starting point of the fund's life.

To measure the investment horizon of any given fund in the sample at the time of any investment, I build a variable which I call fund age, measured as the difference in years between the month of an investment and the month when the fund was created. The creation date of a fund is a noisy

[11] The results are similar or stronger when I filter out firms whose name does not include the acronym "LP" or "L.P.", or the expression "Limited Partnership".

concept: one could consider the date when the fund was launched, the date of its first closing, or the date of its final closing. I identify the creation of the fund as the "initial closing date" provided by SDC. The "initial closing date" is unavailable for 30% of funds in the sample. In this case, I use the "fund year" provided by SDC and set the creation of the fund in January of this year.[12] I check that 48%, 66%, and 98% of investments in the sample occur respectively within 2, 3, and 10 years following fund creation.

I am left with 3,435 funds managed by 1,397 VC firms. I only consider the first cash outlay of each fund in each company in the sample: in what follows, I call an "investment" or "deal" the initial investment of a distinct fund in a distinct company. Hence, if there are two funds investing in the same company at the same date, this counts as two investments or two deals. When a fund makes several sequential investments in a given company, I only consider the first one. I am left with 46,673 investments of distinct funds into 19,607 distinct companies.

SDC's investment database has a companion database of VC-backed initial public offerings (IPOs) and merger acquisitions (M&As), which relates any such event to the names of the funds backing the company. I match my sample with this database on fund names to identify the timing of exits. I am left with 16,711 exits, of which 6,437 IPOs and 10,274 M&As.

For a subset of companies in the main sample, I obtain patenting information from the NBER patent database and the HBS patent database (Lai, D'Amour, and Fleming, 2009), which together cover U.S. patents granted through December 2010. I merge it with my sample on company name and city. I then follow the procedure recommended by Hall, Jaffe, and Trajtenberg (2001) and applied in Lerner et al. (2011) to adjust patents and citations for the truncation bias. I restrict this sample to investments occurring up until 2006. I only keep patents applied in the three years before and the five years after the investment of any given fund in any given firm. I am left with 13,366 investments by 2,364 distinct funds in 4,230 distinct companies, which file a total of 41,971 patents in the eight years around the investment year.

The great advantage of SDC over other private equity data providers is that it relates investments and companies to VC *funds* rather than VC *firms*. However, Stucke (2011) and Harris, Jenkinson, and Kaplan (2012) have recently established that Venture Economics performance data

[12]When there are investments in the database prior to the fund creation date I computed, I reset the fund creation date at the time of the first investment if it happens within the twelve month prior to the computed creation date. I drop any investment prior to this date.

suffers from severe sample selection issues, with the coverage dropping sharply in the early 2000s. Since Venture Economics is a unit of SDC, one might worry that the reporting bias also applies to the investment-level data used in this study. Fortunately, two recent studies have assessed the ability of VentureXpert to accurately report investment-level data. Kaplan, Sensoy, and Strömberg (2002) examine 143 financing rounds in 98 companies from 1986 to 1999. They argue that VentureXpert and VentureSource, another mainstream venture capital database, both exclude 15% of financing rounds, and that the former oversamples larger rounds and California companies. Maats, Metrick, Yasuda, Hinkes, and Vershovski (2011) examine investments made by a sample of 40 VC funds raised between 1992 and 2003 and compare the quality of the coverage of these investments by VentureXpert and VentureSource. They find that the consistency between both databases is low, but that the reliability of fund coverage is higher in VentureXpert, which should be the preferred source for collecting data at the fund level. They note, however, that fund coverage increases with the number of portfolio companies in a given fund. In the appendix to this paper, I compare the coverage of VentureXpert and VentureSource from 1990 to 2010. Panel A compares the annual number of investment rounds in U.S.-based companies in each of these datasets. Panel B compares the annual number of new U.S.-based funds. There does not seem to be any downward reporting bias in VentureXpert after 2000. Hence, I am confident that the sample used in this paper is fairly representative.

2.1 Measuring investor horizon

One of the important contributions of this paper is to provide a clean measure of investor horizon. Since virtually all VC funds have a ten-year finite horizon, I identify between-fund as well as within-fund variations in investment horizon by using the age of the fund at the time of the investment, measured as the log of the number of years between the creation of the fund and any given investment. Funds' contractual agreements usually allow GPs to extend the fund's duration after ten years for up to three years in one-year increments, with the consent of the LPs.[13] An extension of the fund's life enables GPs to liquidate stale investments at a profit instead of having to fire sell them. There is little room for LPs and GPs to extend the fund's duration *be-*

[13] I analyzed a series of 24 hand-collected private equity and VC fund prospectus. They allow for an average of two extensions of one year. A majority of them require the consent of a majority of LPs for an extension to be granted.

yond these contractual extensions. Gompers and Lerner (2001) note that *"unlike other agreements (for example, employment contracts or strategic alliances), these contracts are rarely renegotiated."* Moreover, conversations with practitioners indicate that LPs are unlikely to agree to receive in-kind distributions of shares of unliquidated private companies. Instead, they will trust the VC firm with a liquidation mandate and stop paying (or demand a cut in) management fees. This suggests that the contractual lifespan of the fund is indeed a binding constraint on GPs investment horizon.

2.2 Measuring maturity and innovativeness

I first proxy for the maturity of a company with its age, its development stage, and the number of financing rounds it has received prior to the investment. I construct the following three variables. *Log company age* is the log of the number of years between the month of the investment and the month when the company was founded, as reported by VentureXpert. *Development stage* is a dummy equal to zero for companies classified by VentureXpert as "Startup/Seed" or "Early Stage" and one for later stages. Finally, *Log number of prior rounds* is the log of the number of financing rounds that the company received (from other funds) prior to the investment, according to VentureXpert.

I then proxy for the innovativeness of companies with their research and development effort around the VC investment, measured with the growth in their patent count. To do so, I follow Lerner et al. (2011) and Bernstein (2011) and measure innovation from the NBER and HBS patent databases. I first compute the number of patents per year that any company in the sample applies for in the three years before and the five years following any given investment. Then, for each patent, I count the number of times the patent has been cited by other patents in the calendar year of the patent grant and the three subsequent years. The innovation literature usually interprets the number of citations as a measure of the quality, or economic importance, of the patent. The propensity to patent and to cite previously issued patents varies over time and across technologies. Moreover, towards the end of the sample, patent count underestimates the actual patenting, since many patents that had been applied for, might not have been granted. I follow Hall et al. (2001) and compute scaled patents by dividing each patent by the average number of patents of all companies in the same year and technology class. Similarly, I compute scaled citations as the number of citations a patent receives divided by the average number of citations received by all patents granted in the same year and technology class.[14]

2.3 Summary statistics

Table 1 presents the summary statistics of the sample. Again, I use the terms "investment" or "deal" to describe the initial cash outlay of a distinct fund in a distinct company: if two funds invest in the same company at the same date, this counts as two investments or two deals. When a fund makes sequential investments in a given company, I keep only the first one.

Panel A presents the distribution of fund creations, investments, and exits through time. As expected, 1983-1990, 1997-2000, and 2004-2008 are the most active periods for VC investments. Fundraisings, investments, and exits all increase sharply during these periods. Panel B presents fund level summary statistics. On average, funds invest in 14 different companies and are in their third year when they invest. Panel C presents statistics at the investment level, for dependent and explanatory variables used in the main regression analysis. Panel D shows the distribution of funds' investments throughout their investment life. Two-thirds of investments occur within the first three years of the life of funds. Half of the exits in the sample occur within the first six years. Panel E and F present summary statistics for the sub-sample for which patenting information is available. Companies apply for 1.1 patents per year on average in the three years before and the five years following any given investment. These patents receive on average 8.3 citations in the year each patent was granted and in the three following years.

3 Results

3.1 Company maturity and investment outcome

I start by measuring the extent to which investments in more or less mature companies differ in terms of outcomes, such as holding period, subsequent staging, and probability of a successful exit. I run an investment-level OLS regression of investment outcomes on three measures of company maturity. *Log investment holding period* is the log of number of years between the investment and

[14] One potential concern with using patent data is that firms may decide not to protect their new ideas with patents. Given that I consider within-firm changes in patenting, this concern could affect the analysis only if companies receiving investments by funds with a longer remaining horizon strategically increase patenting following the investment, for reasons orthogonal to their true research and development effort. It is unclear why patenting strategy would depend on horizon, independent of the innovative effort.

the exit through an IPO or a M&A deal. *Log number of rounds* is the log of the number of financing rounds subsequent to the initial investment of a given fund in a given company. *Successful exit dummy* is a dummy equal to one if the investment is exited through an IPO or a M&A, and zero otherwise.[15] The explanatory variables, *Log company age*, *Development stage*, and *Log number of prior rounds* are the three proxies for company maturity and are defined in Section 2. All regressions include year fixed effects. Standard errors are corrected for the clustering of investments at the monthly level. Table 2 presents the results.

Panel A shows that investments in less mature companies are held for a longer period of time. Investments in companies at the seed or early stage of their development are held for 36% longer than companies at later stages of their development. This is consistent with the idea that mature companies are closer to the stage in their life cycle at which they can be sold to outside investors.

VC funds often stage their funding of young companies. They split funding through time and sometimes also condition new funding to the achievement of certain operational milestones. Staging is a way to overcome agency costs related to low asset tangibility or high asset specificity (Gompers, 1995). Moreover, staging is a way for VC funds to gradually learn about a company's type (Bergemann and Hege, 1998). Staging is thus more likely to apply to investments in companies involved in exploration rather than exploitation. Results in Panel B of Table 2 confirm that investments in less mature companies are staged more often. Investments in companies at the seed or early stage of their development are staged by 25% more than investments in companies at later stages of their development.

Finally, I ask whether investments in less mature companies have a higher probability of success. I define a successful exit as the sale to a third party or an IPO. The alternative to a successful exit is a write-off, whereby the investment is discontinued. In the sample, 64% of investments are written off, 22% are exited through the sale to a third party, and 14% are exited through an IPO. Results in Panel C suggest that investments in more mature companies are more likely to be successfully exited than investments in less mature companies. Investments in companies at the seed or early stages of their development have an 8% larger probability to be exited through a sale to a third party or an IPO than investments in companies at a later stages of their development . This suggests that more mature companies might be somewhat less risky than less mature ones.

[15]Exits through IPOs or M&As are the most common proxy for successful exits in the literature.

This might influence the results presented in the upcoming analysis if the appetite for risk varies systematically along funds' life. I will therefore control for within-fund time-varying risk incentives in the baseline multivariate specification.

3.2 Univariate tests

I then ask whether a fund's age is systematically related to the maturity of its investment targets. Before turning to multivariate regression analysis, I compare the characteristics of companies receiving investments from funds close or far away from the end of their investment horizon in simple univariate tests.

Table 3 presents the mean and difference in means of characteristics of companies receiving an investment by funds within their first three years (30,769 investments) and funds beyond their third year of operations (15,904 investments).

It turns out that older funds invest in companies that are 3.5 years older, on average, and have previously received 0.5 more rounds of investments. The probability that older funds invest in "Startup/Seed" and "Early Stage" companies is smaller by 9 percentage points. Altogether, these results suggest that younger and older funds select very different companies. Funds with shorter horizons invest in significantly more mature companies.

3.3 Fund horizon and company maturity

Other mechanisms than horizon alone may account for these univariate differences. First, note that the sample is truncated towards the end of the sample (the last investments of the latest vintages are not observed). Suppose that, for some reason, the general investment style of VC funds changed over time and that the latest fund vintages specialized in very exploratory investments. I would find that younger funds invest in more exploratory projects. I address this issue in the multivariate OLS regressions presented below by using fund and fund vintage fixed effects. Second, suppose that VC firms differ systematically with respect to their investment styles, with some of them having higher skills at detecting and investing in exploratory projects early following their fundraising. The difference in means observed above might simply reflect the difference between skilled and unskilled VC investors. I rule out this channel by adding VC firm (investor) fixed effects in the regression analysis below. Alternatively, if new business creations are cyclical, and if most fundraisings occur at the height of those cycles, then the univariate tests in Table 3 might simply reflect this correlation. I shut down this effect by using year fixed effects in the regressions of the multivariate regressions presented below. Finally, these results could be explained if, for some reason, funds with lower risk targets tend to systematically invest later in their investment life. By including fund fixed effects in the multivariate specifications presented below, I control for the fund risk target, as well as any other time-invariant fund characteristics.

Nonetheless, even if funds indeed systematically shift towards less mature projects as they get closer to liquidation, other time-varying features of VC funds (rather than their limited lifespan only) may account for this fact. The first one is their risk appetite. GPs are usually compensated based on an annual 2% of commitments and 20% of the overall performance of the fund above a hurdle rate (usually around 8%), the carried interest. Hence, at any given point in a given fund's investment life, if cumulative performance has been lower than the hurdle rate, the value of the carried interest is zero. Suppose that a fund manager can choose either a high risk and high return project or a low risk and low return project. It is clear that a lower level of past performance shifts the manager's preference towards the high risk and high returns project, since it is more likely to bring her carried interest back in the money in case of success, and since it won't change the carried interest value in case of failure. Since less mature companies are plausibly more risky than more mature ones, time-varying risk appetite might be a concern if funds systematically do well in their first years, which would decrease their incentives to take risks later on. I will make sure that this is not driving the relationship between investor horizon and companies' maturity by controlling for past performance in all regressions.[16]

VC firms raise new funds every three to five years. As has been evidenced by Gompers (1996) and more recently Chung et al. (2012), this is likely to dramatically influence managers' behavior, especially young ones that have not yet established reputation and that potentially face more difficulty in raising funds. I address this concern by including in all regressions a dummy for first-time funds and a dummy indicating whether the VC firm has raised a follow-up fund already. If fundraisings have an influence on the change in investment behavior towards the end of a fund's investment life, then these variables should capture it.

Since funds have limited resources, they are likely to pick less complicated assets once they

[16]I use the number of past exits as a proxy for past performance, a measure widely used in the literature.

already have a number of other investments to manage, which is likely to happen towards the end of their investment life. Suppose that innovative projects are more costly to monitor. Then I might observe that as a fund gets closer to the end of its investment life, it invests in less innovative assets because it already devotes all its available resources to monitor its existing investments. I control for this with the number of investments that the fund has made since its creation.

I now turn to a formal test of *Hypothesis 1.* I use OLS regressions to show that as a fund gets closer to liquidation, it selects more mature companies. I analyze the maturity of a company along three dimensions: its age, its development stage at the time of the investment, and the number of financing rounds (involving other funds) it received prior to the investment.

I estimate the following OLS specification at the investment level:

$$V_{i,t} = \alpha + \lambda_1 Age_{i,t} + \lambda_2 X_{i,t} + \gamma_i + \mu_t + \epsilon_{i,t}$$

$V_{i,t}$ is the variable of interest at time t of the investment of fund i, $Age_{i,t}$ is the log of the age of fund i at time t, $X_{i,t}$ is a vector of fund level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. γ_i and μ_t are fund and time fixed effects. Standard errors are clustered by month.

I first consider how funds shift their investments towards younger companies as their horizon shrinks. To do so, I run the investment level OLS regression with the log of company's age as the dependent variable. Several specifications are run with fund vintage, year, VC firm and fund fixed effects. As evidenced in Panel A of Table 4, funds with shorter horizon invest in younger companies. A one standard deviation increase in the age of the fund (which roughly amounts to moving from the first year to the fourth year of operations of the fund) leads to an increase in the age of the target by between 8 and 16%.

The age of the company might fail to account precisely for its development stage. Companies might have been founded for a few years and yet remain at a very early stage of their development. So I run a similar investment level OLS regression of the development stage dummy on the log of fund age and the same set of controls and fixed effects. As expected, the coefficient on fund age is positive and significant across specifications presented in Panel B of Table 4. A one standard deviation increase in the age of the fund leads to an increase in the probability of the target to be beyond the early stage by 5 to 13%.

Finally, I run the investment-level OLS regression of the log number of prior rounds on the log of fund age and the same set of controls and fixed effects. Again, the coefficient on fund age is positive and significant across specifications presented in in Panel C of Table 4. A company receiving an investment by a fund in its fourth year has had 11% to 15% more previous rounds of financing on average than a company receiving an investment by a fund in its first year of operations.

Interestingly, the level of past performance has a negative effect on the propensity of funds to select younger companies. In virtually all regressions, the coefficient on the number of past exits is positive and statistically significant. This is consistent with the idea that funds select more innovative or less mature companies when their risk incentives increase (when their carried interest is out of the money). Moreover, the coefficient on the interaction between the first-time fund dummy and the number of past exits is of the opposite sign. This is consistent with Chung et al. (2012) and other related papers, which argue that most of the performance of first-time funds should be related to future fund flows, while the performance of established funds should be related to the carried interest on their current fund. Therefore, the behavior of established funds should be more sensitive to the value of the carried interest: when performance has been low, their incentives to take on more risk increase, which might lead them to undertake more exploratory investments. Note however that these effects do not subsume the effect of fund horizon.

If the strong and robust pattern in fund investment is due to their limited horizon, the effect should be weaker or absent for investors that have fewer or no constraints on their investment horizon. In Table 5 , I perform the same test on a sample corporate venture and evergreen funds, which are typically less constrained by an investment horizon (Chemmanur et al., 2011). I find no effect of fund age on the maturity of investments. This confirms that the sensitivity of investment decisions to their horizon is specific to VC funds.

3.4 Fund horizon and innovation

In this paragraph, I take another perspective at the innovative effort of startup companies. I check whether companies that receive investments by younger funds are more innovative, as measured by the increase in the number of patents they issue each year and the number of citations these patents receive.

I start by providing graphic evidence of the different patenting dynamics in companies targeted by funds with different horizons. To do so, I keep any investments in the sample up until December 2006. I am left with 13,366 investments of 2,364 funds in 4,230 companies. I split the sample into two sub-samples of investments involving old and young funds. An investment is allocated to the young fund sample if it happens within the first 36 months of the life of the fund. It is allocated to the old fund sample otherwise. In each sub-sample, I compute the average number of patent applications in the three years prior and the four years following the investment. The results are presented in Figure 2. As it appears on the graph, funds with a longer investment horizon select companies that applied for fewer patents prior to the investment. I formally check this by running the same OLS regression as in the previous paragraph on a dummy equal to one if the company has ever applied for a patent prior to the investment. Results are presented in Table 6. A one standard deviation increase in the age of the fund increases the probability that the fund invests in a company that has already applied for a patent by 5 to 13%.

I then analyze patenting dynamics around the investment. From Figure 2, it appears that companies with long-horizon investors issue approximately 0.5 more patents and 0.2 more scaled patents per year following the investment. They grow their patent count faster than companies with short-horizon investors both before and after the investment. I consider the three years before and the five years after the investment of any fund in any company in the sample up until December 2006 and run the following company×year OLS regression:[17]

$$
\begin{aligned}
PC_{j,t+k} \quad = \quad & \alpha_0 + \alpha_1 Age_{i,t} + \alpha_2 F_{i,t} + \alpha_3 C_{j,t} + \sum_{k=-3}^{5} \lambda_k Y_{t+k} + \sum_{k=-3}^{5} \beta_k Y_{t+k} \times Age_{i,t} \\
& + \sum_{k=-3}^{5} \delta_k Y_{t+k} \times F_{i,t} + \sum_{k=-3}^{5} \theta_k Y_{t+k} \times C_{j,t} + \epsilon_{i,j,t}
\end{aligned}
$$

[17] I check that all the results using patenting and citation data are robust when using a Poisson model instead of an OLS regression model.

$PC_{j,t+k}$ is the log of one plus the number of patent applications by company j in year k around the investment year t. Y_{t+k} is a dummy equal to one in the k^{th} year around the investment of fund i in company j which occurs in year t. $Age_{i,t}$ is the log of the age of fund i at the time of the investment. $F_{i,t}$ is a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. $C_{j,t}$ is a vector of company-level controls, including the log of company age, state, and sector dummies. Standard errors are clustered at the company level. Panel A of Table 7 presents the results of the specifications using company fixed effects, while Panel B includes company level controls for age, sector, and state of incorporation. As expected, the results presented in Table 7 show that companies invested by VC funds further away from liquidation increase their patenting activity more in the five years following the investment. A one standard deviation increase in the age of the fund leads to a 17 to 25% larger increase in patent count following the investment. The fact that the slope of patent growth is related to fund age both before and after the investment confirms that younger funds target more innovative companies. When controlling for observable company characteristics in panel B, the difference in patenting *before* the investment is smaller. However, the difference remains significant following the investment.

I check whether the relatively stronger increase in patenting activity in companies with long-term funding is not achieved at the cost of the quality of patents by studying the change in citation count per patent. I consider the three years before and the five years after the year of the investment of any fund in any company in the sample up until December 2006 and run the same regression as above, although at the patent level rather than the company×year level. Results in Table 8 provide evidence that patent quality does not decrease in companies that have received investment from funds further away from liquidation. Following the investment, companies that receive funding from a fund in its first year of operations apply to patents that receive 3 to 6% more citations than patents applied by companies that receive funding from a fund in its fourth year of operations.

Taken together, these results indicate that variations in funds' horizon have a strong effect on the type of companies that receive VC funding, as far as patenting is concerned. These results could reflect the fact that long-horizon VC funds invest in companies with a more intensive innovative activity. They could reflect the fact that long-horizon VC funds select firms at an earlier stage of their development, when they are still growing their patent stock at a high pace. Both interpretations confirm that variation in funds' horizon strongly predict variations in the type of companies which receive funding.

3.5 Horizon and market conditions

In this section, I ask whether the sensitivity of project selection to investor horizon varies with market conditions. There are several reasons why horizon should matter less in hot markets. If recent returns on innovative companies have been high, investors could infer that the appetite for innovation has increased. Those with shorter horizon could select more innovative projects with the hope of re-selling them quickly at no discount. I measure market conditions with the cumulative returns on the Nasdaq Composite Index in the twelve months up to the month of the deal. I rank months in the sample based on these backward-looking returns. *Hot market conditions* is a dummy equal to one (zero) if the past twelve month returns on the Nasdaq Composite Index lie in the top (bottom) tertile of the sample distribution. I then run an investment level OLS regression of the proxies for company's maturity on the log of fund age interacted with *Hot market conditions*. All specifications include a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. Several specifications are run with year and VC firm fixed effects. Standard errors are clustered by month.

Panel A of Table 9 presents the results. The coefficient on the interaction term is always negative and significant, suggesting that the wedge between the investment decision of young and old funds shrinks in hot markets. The propensity of shorter horizon funds to select more mature companies is significantly lower when the returns of the Nasdaq Composite Index in the past year have been abnormally high. In Panel B, I replace the *Hot market conditions* dummy with the age of companies that were exited through IPOs or M&As in the year prior to the investment. The coefficient on the interaction term is highly significant, while the coefficient on the log of fund age becomes insignificant. Results obtained in Panel A and Panel B are consistent with the idea that when the in bear markets, on in times where the time-to-exit increase, the horizon constraint of

VC funds becomes significantly more binding.

3.6 Horizon and VC firm experience

This section explores the extent to which the propensity to match the maturity of assets with the ten-year liability structure varies in the cross-section of funds. More specifically, I ask whether the sensitivity of project selection to horizon is weaker or stronger for experienced GPs. I measure the experience of the GP alternatively with *log VC firm age*, i.e., the log of the number of years since the VC firm has been operating, the *log VC firm number of investments*, i.e., the log of the number of investments made by the GP (VC firm), before raising the fund and the *log VC firm nb. of funds raised*, i.e., the number of funds raised by the VC firm prior to the investment. I then run an investment-level OLS regression of the proxies for company's maturity on the log of fund age interacted with the three measures of GP experience. All specifications include controls for the average of the maturity proxy in companies in which the fund invested prior to time t, and a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time fund. Several specifications are run with year and private equity firm fixed effects. Standard errors are clustered by month.

Table 10 presents the results. In Panel A, *log VC firm age* proxies for the experience of the VC firm. The results indicate that more experienced firms show a larger shift towards less innovative projects as their fund moves closer to liquidation. Panel B and C confirm this results when experience is proxied with the *Log GP number of investments* and the *log VC firm nb. of funds raised*. Hence, more experienced VC firms operate a steeper shift towards less innovative projects as their funds get closer to liquidation. These findings suggest that more experienced funds have a better ability to match their assets with their fixed horizon liability structure. This ability could stem from know-how, from privileged access to a wider range of projects, or from the fact that more experienced VC firms run overlapping funds and thus better match target and fund maturity. These results should not come as a complete surprise: if the fixed horizon structure of limited partnerships was hurting experienced VC investors more than non-experienced ones, the former would be likely to offer an alternative contractual agreement to their LPs. They point out, however, that one dimension of VC investing is to manage the maturity of their portfolio of companies, and that experienced investors seem to be better at doing so. This finding also suggests that the higher ability of experienced funds to match maturities might be a key component of their higher performance (Kaplan and Schoar, 2005).

Horizon and exits I check whether exit patterns are consistent with time-constrained funds selecting more mature targets, i.e., targets with a larger probability of a successful exit. I run an investment-level OLS regression of the successful exit dummy on the log of fund age, and a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. Results are presented in Table 11. In columns (2) to (4) the log of fund age is interacted with successively the *log VC firm age*, i.e., the log of the number of years since the VC firm has been operating (column 2), the *log VC firm number of investments*, i.e., the log of the number of investments made by the GP (VC firm) before raising the fund (column 3), and the *log VC firm nb. of funds raised*, i.e., the number of funds raised by the VC firm prior to the investment (column 4). Overall, a one standard deviation increase in fund age is associated with a 5% (2.4 percentage points) increase in the probability of a successful exit. When fund age is interacted with the measures of VC firm experience, in columns 2 to 4, the coefficient on the interaction term is highly significant. These results are consistent with the idea that more experienced investors are better at matching fund and target maturity, which translates in more successful exits towards the end of their fund's investment life.

These results do not imply that GPs are not acting in the interest of LPs, given the fixed horizon embedded in their contractual structure. Conditional on this contractually fixed horizon, the optimal behavior from the perspective of the LPs is to maximize returns, and thus to shift towards more mature investments, which is precisely what GPs seem to be doing, especially the most experienced ones. Hence, the need to overcome agency problems between GPs and LPs by limiting the investment horizon of VC funds leads to a second best outcome, whereby fund managers restrict their set of potential targets to more mature companies as their horizon shrinks.

Aggregate implications Finally, I make a tentative exploration of the aggregate implications of these findings. First, if successive generations of VC funds overlap so that funds with long remaining horizon are available at all times to finance early-stage companies, then the time constraint on individual funds should have no effect on the aggregate amount of VC funding going to younger firms. In practice, VC fundraisings are highly cyclical, so that there are periods when the aggregate dry powder is characterized by a short investment horizon. This might lead aggregate VC funding to be tilted towards later stage companies. In Table 12, I present the results of timeseries OLS regressions where the dependent variable is the average age of companies receiving their first VC investment in this quarter. The coefficient on the dry powder maturity (lagged) is positive and significant, suggesting that in times when funds available for investment have shorter horizons, companies which receive their initial VC investment are older on average. It could be the case that in those times, the overall demand for funding of younger companies goes down. To address this concern, I include as a control the average of companies receiving their initial investment by corporate venture capital and evergreen funds, which have been shown above to be less constrained than VC funds. If the correlation documented in column (1) is purely driven by a demand effect, this additional variable should capture most of it. In column (2), the coefficient on the dry powder maturity remains positive and significant. The results are similar when I substitute VC dry powder measures with buy-out ones (columns (3) and (4)). This suggests that the relationship between dry powder maturity and the age of funded companies is not driven by the fact that VC funds might all strategically time their fundraisings to coincide with the differential demand of early- and later-stage companies.[18] The results are also similar when the dependent variable is the average age of companies receiving any venture capital investment in this quarter (Panel B). While only suggestive, the results indicate that aggregate variations in the horizon of VC funds available for investment might lead to shifts in the maturity of companies that receive VC funding.

Second, if VC funds manage the maturity of their investments according to their ten-year horizon, companies in industries with a structurally longer average timespan from creation to IPO or M&A, might receive their first round of VC financing at a later stage. In Table 13, I run a cross-sectional industry-level OLS regression of the average company age receiving VC funding in

[18] It is however possible that macro-economic factors that influence both VC and buy-out fundraisings also increase the relative demand of early-stage companies for financing. To address this concern, the regressions control for Nasdaq cumulative returns.

a given industry on the length of firms' life cycle in this industry, where the length of industry life cycle is measured as the average number of years between a firm's creation and exit through an IPO or an acquisition. To compute this proxy for the expected life cycle of companies in any given industry, I consider all companies receiving any kind of investment reported in VentureXpert. I use the industrial classification of VentureXpert and I keep industries with at least one exit during the sample period (423 sectors). In Panel A, the dependent variable is the average age of companies receiving their initial VC funding in this industry. The coefficient is negative and significant in column (1), indicating that companies in industries with longer life cycles tend to receive VC funding later after their creation. Of course, this observation in itself could be explained by a lower demand for VC funding for early-stage companies in these sectors. To address this concern, I include the average age of companies receiving their initial funding by corporate venture capital or evergreen funds, which, as described above, are less constrained than VC funds. If the negative relationship found in the first column is fully explained by differential demand for funding of early-stage companies across sectors, this additional control should subsume the coefficient on the industry time-to-exit. As evidenced in column (2), while the coefficient goes down slightly, it remains negative and significant. Results are similar in the specifications presented in columns (2) and (3) where the proxy for the length of the industry's life cycle is adjusted for cohorts effects. They are also similar in Panel B, where the dependent variable is the average age of companies receiving any investment in this industry.[19] The results confirm that companies in sectors with longer life cycles receive their initial round of VC financing significantly later on average. This is consistent with the idea that the supply of VC funding is sensitive to the expected life cycle of firms. This also helps explain why some sectors seem to be receiving much less VC investments than others.

4 Conclusion

This paper studies whether the horizon of VC funds affects their decisions to invest in more or less mature projects. In principle, funds' limited horizon should not affect GPs investment decisions. The maturity of liabilities is irrelevant for the choice of the maturity of assets on a fund's balance

[19] As in the rest of the paper, an investment is defined as the initial outlay of a given fund in a given company.

sheet (Modigliani and Miller, 1958). Frictionless capital markets effectively allow investors to transfer wealth through time. Even when assets mature later than liabilities, investors can sell them at fair value before maturity. Therefore, in the absence of friction, variations in investors' horizon are unrelated to the maturity of projects they select. However, horizon may affect investment decisions if there are large information asymmetries between initial investors and prospective buyers of an innovative firm, and if theses asymmetries are time-varying. If the information gap between insiders and outsiders is gradually bridged through time, as the company's outcomes become observable, then the timing of exit becomes crucial, and the horizon of initial investors might affect their investment decisions ex ante.

I measure the maturity of companies by their age, their development stage, the number of prior rounds of financing they have received, and their patenting behavior. I find strong evidence that fund's horizon affect their selection of more or less mature and innovative companies. A one standard deviation increase in the age of the fund leads to an increase in the maturity of targeted companies by 8 to 16%. A one standard deviation increase in the age of the fund leads to a 17 to 25% larger growth in patent count around the investment. I then show that the propensity of shorter horizon funds to select more mature companies is stronger in bear markets, and for more experienced investors. Finally, I explore the aggregate implications of these findings and show that companies receive VC funding at later stages when the aggregate dry powder has a short-term horizon, and in sectors with longer life cycles.

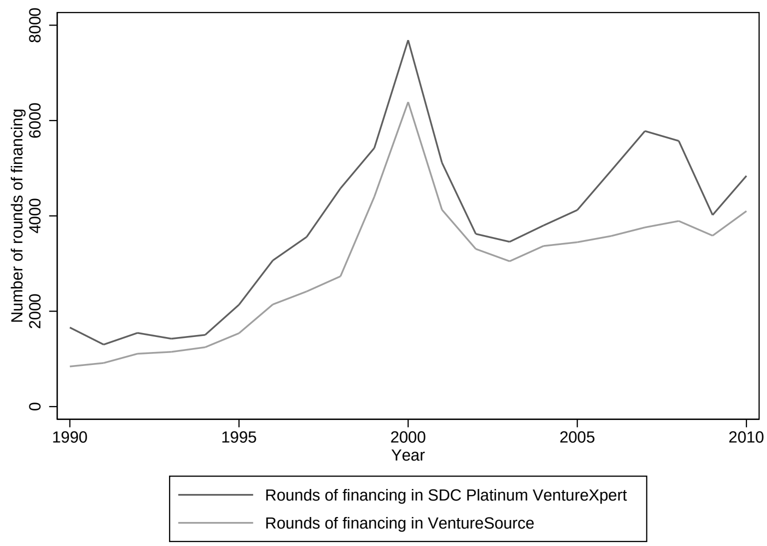
Taken together, the results indicate that agency concerns between GPs and LPs, which translate into such the limited horizon of VC funds, have real effects on funds behavior, and consequently on the funding available for young companies.

A Variables definition

Definition of the main variables	
Log fund age	Log of one plus the number of years between the month of the investment and the month when the fund was created.
Log number of rounds	Log of one plus the number of investment rounds of the fund in the company following the initial investment of a fund in this company.
Log number of prior rounds	Log of the number of financing rounds (involving other funds) received by the company until the investment of the fund.
Development stage dummy	Dummy equal to zero for companies classified by VentureXpert as “Startup/Seed” or “Early Stage” and one for later stages.
Log company age	Log of one plus the number of years between the month when the company was founded and the month of the initial investment of a fund in this company.
Log investment holding period	Log of the number of years between the month of the initial investment of a fund in the company and the initial public offering of the company or its sale to a third party (M&A).
Log number of past exits	Log of one plus the number of IPOs or M&As of companies which previously received an investment from the fund.
Log number of past investments	Log of one plus the number of previous investments made by the fund.
Follow-up fund dummy	Dummy equal to one if the VC firm operating the fund has raised a follow-up fund at the time of the investment, and zero otherwise.
Log fund size	Log of the size of the fund measured in million dollars.
First-time fund dummy	Dummy equal to 1 if the fund is the first one raised by the VC firm.
Log patents	Log of one plus the number of patents applied by a company in a given year around a VC investment.
Log scaled patents	Following Hall et al. (2001): log of one plus the number of patents applied by a company in a given year scaled by the average number of patents applied by all companies in the same year and technology class.
Log citations	Log of one plus the number of citations received by a patent in the year it was granted and in the three following calendar years.
Log scaled citations	Following Hall et al. (2001): log of one plus the number of citations a patent receives divided by the average number of citations received by all patents granted in the same year and technology class.
Hot market conditions	Dummy equal to one for months that lie in the top tertile of the distribution of past twelve months cumulative Nasdaq Composite returns, and zero for months in the bottom tertile
Log VC firm nb. of inv.	Log of the total number of investments reported in VentureXpert made by the VC firm prior to raising the fund.
Log VC firm nub. of funds raised	Log of the number of the fund in the sequence of funds raised by the VC firm.
Log VC firm age	Log of the number of years of operations of the VC firm.
Prior patenting dummy	Dummy equal to one if the company has ever applied for a patent prior to the investment.

B Representativeness of the sample

A. Annual number of investment rounds (1990-2010)



B. Annual number of fundraisings (1990-2010)

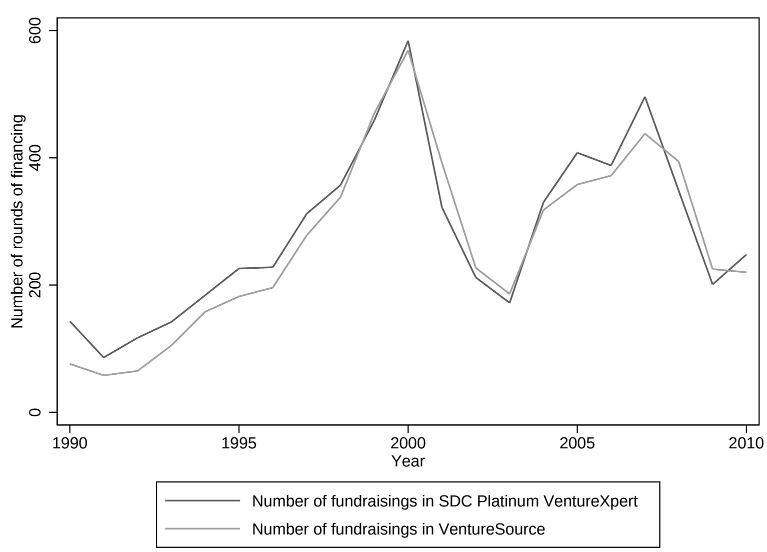


Figure 1. Coverage of SDC Platinum VentureXpert and VentureSource This figure compares the coverage of SDC Platinum VentureXpert and Venturesource, the two main venture capital investment-level datasets. Panel A compares the annual number of investment rounds in U.S.-based companies in each of these datasets. Panel B compares the annual number of new U.S.-based VC funds.

C A simple model of investor horizon and the choice between exploration and exploitation

This simple model draws from the model developed in Manso (2011), and used in Ferreira et al. (2012). It shows that because of the information asymmetry between a VC investor and outside buyers, short-term VC funds refrain from funding exploratory projects, that take longer than conventional ones to produce observable payoffs.

Suppose that investors can provide funding to two company types that are operational for two periods. Companies of the first type exploit existing ideas, while companies of the second type explore new ideas. Type 1 delivers cash flows of 1 with probability p and 0 otherwise. If 1 is obtained in the first period, then type 1 delivers 1 again with probability p in the second period, and 0 otherwise. If 0 is obtained in the first period, then the company shuts down. Type 2 has a similar payoff structure and delivers 1 with probability δp, and 0 otherwise in period 1. If 1 is obtained in the first period, then type 2 delivers X with probability θp in the second period, and 0 otherwise. If 0 is obtained in the first period, then the company shuts down.[20]

I assume for simplicity that δ, X and θ are such that both types have the same net present value over the two periods:

$$\delta p + \delta\theta p^2 X = p + p^2$$

However, type 2 is less profitable than type 1 in period 1 and the reverse is true in period 2:

$$\delta < 1 \text{ and } \theta X > 1$$

There are short-term and long-term risk neutral investors deciding on a unique investment at the beginning of period 1. Short-term investors have to liquidate their investment by selling it to outside unsophisticated short-term investors at the end of period 1. Long-term investors can hold on to their investment for two periods and have the option to sell their investment at the end of period 1 to outside unsophisticated short-term investors.[21]

Outside unsophisticated short-term investors can buy companies at the end of period 1 when the initial investors wish to sell them. They observe interim results (1 or 0) and whether the initial investor is short or long-term. But they do not observe the type of the company, i.e., whether the company is exploiting an existing idea or exploring a new one.

[20] The fact that projects shut down following an early failure simplifies the exposition. The same result could be obtained if, as in Ferreira et al. (2012), both projects deliver 1 with probability p and 0 with probability $1 - p$ in the second period, following a failure in period 1.

[21] The assumption that only unsophisticated short-term investors can buy at the interim period could be interpreted as the fact that the supply of unsophisticated short-term investors is large while the supply of sophisticated ones is smaller.

At the end of period 1, if investors wish to liquidate their investment, they need to agree on a price with outside buyers. These unsophisticated potential buyers will bid a price not less than their estimation of the residual project cash flows, conditional on the information they observe at the end of period 1. Let us call this estimation E. Since they do not know and have no way to observe types, they will offer a single price E such that:

$$p \leq E \leq \theta p X$$

Coming back to the beginning of period 1, long-term investors are indifferent between the two types since they both have the same net present value. The only way for them to make more money would be to invest in type 1 and try to sell it at a price $E > p$ at the end of period 1. However, outside investors would be aware of that and offer a price $E = p$ to long-term investors, making them indifferent between selling or keeping type 1 company in period 2.

Consider now the decision of short-term investors. Since they live only one period, they have to sell their investment at the end of period 1. The payoff from funding type 1 is $p + pE$ while the payoff of funding type 2 is $\delta p + \delta pE$. Since $\delta < 1$, short-term investors will always select type 1.

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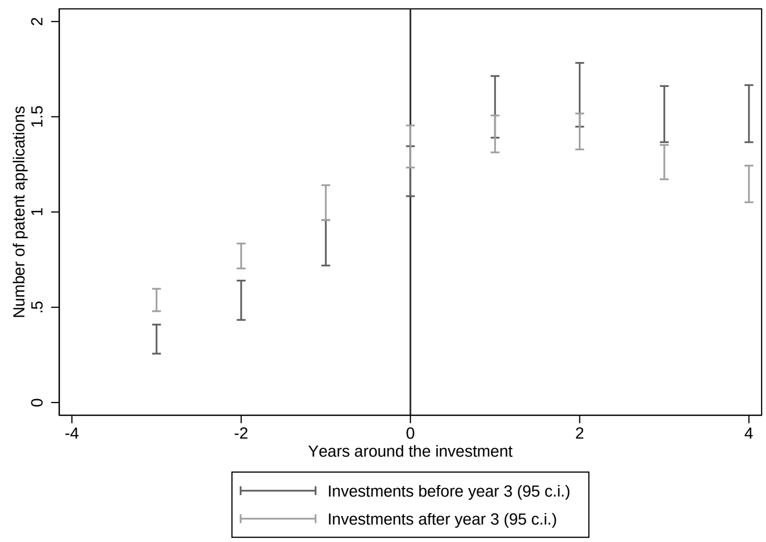
A. Average number of patent applications per year



B. Average number of scaled patent applications per year

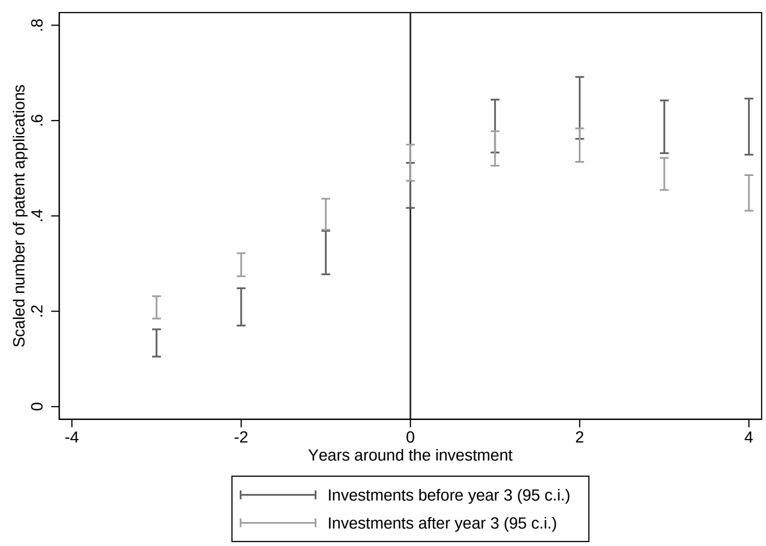


Figure 2. Fund horizon and patenting around venture capital investments This figure presents the average patent applications in the three years prior and the five years following each investment. For the purpose of this analysis, the sample is restricted to investments made up until 2006 in companies that could be matched to the NBER and HBS patent databases. In each panel, the darker brackets present the 95 confidence interval of the average annual patent count of companies receiving investments by funds in their first three years of operations (8,681 investments), while the lighter brackets present the 95 confidence interval of the average annual patent count of companies receiving investments by funds beyond their third year of operations (4,685 investments). Panel A presents average patent counts, while Panel B presents average scaled patent counts, where the number of patents applied for by a given company is scaled by the average number of patents granted to all companies in the same year and technology class.

Table 1. Summary statistics

Panel A presents the distribution of fund creations, investments, and exits across years. Panel B shows fund level statistics while Panel C shows investment-level statistics. Panel D shows the distribution of investment and exits through initial public offerings of merger and acquisitions by fund age (in years). Panel E displays the distribution of investments, patent applications, and grants per year. Panel F shows the distribution of patents (per year around the investment) and citations (per patent).

Panel A: Distribution of fund creations, investments, and exits

Year	Number of new funds	Number of investments	Number of exits
1980	42	92	1
1981	64	338	2
1982	74	757	2
1983	98	1180	19
1984	93	1267	13
1985	78	1118	13
1986	63	1390	43
1987	76	1331	32
1988	63	1291	26
1989	74	1132	22
1990	39	906	25
1991	33	643	59
1992	61	895	93
1993	71	767	98
1994	79	836	89
1995	97	803	133
1996	113	1159	164
1997	175	1603	128
1998	188	2002	149
1999	276	3477	268
2000	402	5106	305
2001	196	2877	170
2002	84	1813	173
2003	93	1876	177
2004	141	2108	271
2005	155	2035	247
2006	154	1995	265
2007	145	2006	290
2008	120	1789	215
2009	51	1041	179
2010	37	1040	308

Panel B: Fund-level summary statistics

Variables	Obs.	Mean	Median	Std. dev.
Number of investments (in distinct companies)	3435	13.59	9.00	14.46
Number of sectors	3435	4.06	4.00	2.65
Fund age	3435	3.27	2.82	2.07

Panel C: Investment-level summary statistics

Variables	Obs.	Mean	Median	Std. dev.
Log company age (in years)	46673	1.079	1.099	0.883
Log investment sequence number	46673	0.634	0.693	0.674
Stage dummy (=0 for seed and early stage)	46673	0.510	1.000	0.500
Log fund age (in years)	46673	0.949	1.099	0.697
Log number of past exits	46673	0.446	0.000	0.708
Log number of past investments	46673	2.171	2.303	1.081
Follow-up fund dummy	46673	0.446	0.000	0.497
Log fund size	46673	4.313	4.404	1.604
First-time fund dummy	46673	0.273	0.000	0.446
Exit dummy	46673	0.358	0.000	0.479

Panel D: Distribution of investments and exits throughout fund life

Fund age	Investments			Exits (IPOs + M&As)			IPOs		
	Nb.	Percent.	Cum . percent.	Nb.	Percent.	Cum. percent.	Nb.	Percent.	Cum. percent.
1	11224	24%	24%	398	2%	2%	151	1%	1%
2	11254	24%	48%	974	6%	8%	496	5%	6%
3	8291	18%	66%	1517	9%	17%	812	8%	14%
4	5608	12%	78%	1797	11%	28%	1039	10%	24%
5	3657	8%	86%	1903	11%	39%	1195	12%	36%
6	2277	5%	91%	1994	12%	51%	1255	12%	48%
7	1355	3%	94%	1599	10%	61%	1000	10%	58%
8	902	2%	95%	1591	10%	70%	1039	10%	68%
9	646	1%	97%	1254	8%	78%	897	9%	77%
10	359	1%	98%	1025	6%	84%	707	7%	84%
11	253	1%	98%	744	4%	89%	488	5%	88%
12	185	0%	99%	525	3%	92%	302	3%	91%

PANEL E: Distribution of investments, patent applications, and patent grants per year

Year	Investments	Patent applications	Patent grants
1978	-	9	1
1979	-	21	-
1980	9	45	11
1981	80	107	19
1982	170	144	23
1983	251	159	69
1984	268	243	134
1985	311	329	175
1986	352	410	198
1987	351	475	345
1988	393	499	395
1989	333	563	579
1990	221	622	500
1991	218	644	554
1992	312	717	610
1993	285	746	607
1994	312	1046	659
1995	256	1708	668
1996	355	1642	833
1997	544	2436	1122
1998	714	2846	1734
1999	951	3325	1991
2000	1396	4271	2420
2001	1157	4756	2699
2002	833	4646	3088
2003	923	3936	3587
2004	929	3199	3523
2005	799	2965	3168
2006	643	1788	3827
2007	-	1305	3287
2008	-	476	2864
2009	-	115	2922
2010	-	11	3593

PANEL F: Mean patent and citation count

	Obs.	Mean	Std. Dev.
Patent applications per year	106925	1.13	5.51
Scaled patent applications per year	106925	0.44	2.06
Citations per patent	41971	8.29	14.46
Scaled citations per patent	41919	1.92	4.60

Table 2. Company maturity and investment outcome

This table presents the results of investment-level OLS regressions of various investment outcomes on three proxies for company maturity. Log company age is the log of the number of years between the creation of the company and the investment. The log number of prior rounds is the log of the number of previous financing rounds (involving other funds) received by the company until the investment by a given fund. The development stage of a company is measured with a dummy equal to zero for companies classified by VentureXpert as "Startup/Seed" or "Early Stage" and one for later stages. In Panel A, the dependent variable is the log of number of years between the investment and the exit through an IPO or a M&A deal. In Panel B, the dependent variable is the log of the number of financing rounds subsequent to the initial investment of a given fund in a given company. In panel C, the dependent variable is a dummy equal to one if the investment is exited through an IPO or a M&A and zero otherwise. Standard errors are corrected for clustering at the monthly level and presented in parenthesis. *** indicates that the difference in means is significant at the 1% level.

PANEL A: Log investment holding period			
Log company age	-0.12***		
	(0.01)		
Development stage dummy		-0.36***	
		(0.02)	
Log nb. of prior rounds			-0.27***
			(0.01)
Constant	1.25***	1.31***	1.31***
	(0.01)	(0.01)	(0.01)
Year FE	Yes	Yes	Yes
Observations	10379	10379	10379
R^2	0.090	0.117	0.121
PANEL B: Log number of subsequent rounds			
Log company age	-0.12***		
	(0.00)		
Development stage dummy		-0.25***	
		(0.01)	
Log nb. of prior rounds			-0.14***
			(0.01)
Constant	0.70***	0.69***	0.65***
	(0.01)	(0.01)	(0.01)
Year FE	Yes	Yes	Yes
Observations	31690	31690	31690
R^2	0.071	0.079	0.061
PANEL C: Successful exit dummy			
Log company age	0.02***		
	(0.00)		
Development stage dummy		0.08***	
		(0.01)	
Log nb. of prior rounds			0.09***
			(0.00)
Constant	0.30***	0.29***	0.27***
	(0.00)	(0.00)	(0.00)
Year FE	Yes	Yes	Yes
Observations	31690	31690	31690
R^2	0.068	0.074	0.083

Table 3. Horizon and company maturity: univariate tests

This table presents the mean and difference in means of characteristics of companies receiving an investment by funds within their first three years (30,769 investments) and funds beyond their third year (15,904 investments). Company age is the number of years between the creation of the company and the investment. Number of prior rounds is the number of previous financing rounds (involving other funds) received by the company until the investment by a given fund. The development stage of a company is measured with a dummy equal to zero for companies classified by VentureXpert as "Startup/Seed" or "Early Stage" and one for later stages. Number of rounds is the number of follow-up cash outlays made by the fund in the company subsequent to the initial investment. The holding period is the number of months between the investment and a successful exit, conditional on a successful exit. Standard errors are presented in parenthesis. *** indicates that the difference in means is significant at the 1% level.

		Investments until year 3	Investments beyond year 3	Difference
Company age at investment (in years)	Mean	1.59	5.08	-3.49***
	Std. dev.	(0.78)	(1.95)	
Nb. of prior rounds	Mean	2.23	2.71	-0.47***
	Std. dev.	(1.80)	(2.22)	
Development stage dummy (=0 for seed and early stage)	Mean	0.48	0.57	-0.09***
	Std. dev.	(0.50)	(0.50)	
Number of rounds	Mean	2.41	2.06	0.35***
	Std. dev.	(1.81)	(1.59)	
Holding period (months)	Mean	57.58	53.32	4.27***
	Std. dev.	(39.56)	(37.20)	

Table 4. Fund horizon and company age

This table presents the results of an investment-level OLS regression of proxies for company maturity on the log of fund age and a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. Several specifications are run with fund vintage, year, VC firm, and fund fixed effects. In Panel A, the dependent variable is the log of fund age; the company's development stage is the dependent variable in Panel B; in Panel C, the dependent variable is the log number of prior rounds. Standard errors are clustered by month and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

Panel A: log company age (in years)						
Log fund age	0.23***	0.18***	0.22***	0.21***	0.13***	0.21***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund nb. of exits	0.06***	0.06***	0.03***	0.04***	0.05***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First-time fund × Log fund nb. of exits	-0.05***	-0.05***	-0.05***	-0.06***	-0.05***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)
First-time fund	-0.01	-0.00	-0.11***	-0.04**	-0.03*	
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	
Log fund nb. of past investments	-0.05***	-0.05***	-0.05***	-0.04***	-0.04***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Follow-up fund dummy	-0.07***	-0.06***	-0.02*	-0.02*	-0.00	-0.03*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Log fund size	0.00	0.00	-0.00	-0.03***	-0.03***	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Constant	0.97***	1.01***	1.01***	0.85***	1.18***	0.94***
	(0.02)	(0.02)	(0.02)	(0.13)	(0.09)	(0.02)
Vintage fixed effects	Yes	No	No	Yes	No	No
Inv. year fixed effects	No	Yes	No	No	Yes	No
VC firm fixed effects	No	No	Yes	Yes	Yes	No
Fund fixed effects	No	No	No	No	No	Yes
Observations	46673	46673	46673	46673	46673	46673
R^2	0.035	0.040	0.148	0.152	0.160	0.209

Panel B: Development stage dummy						
Log fund age	0.08***	0.08***	0.07***	0.08***	0.06***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund nb. of exits	0.05***	0.06***	0.02***	0.02***	0.03***	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First-time fund × Log fund nb. of exits	0.01*	0.01	-0.02***	-0.01*	-0.02**	-0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First-time fund	-0.03***	-0.03***	-0.04***	-0.02*	-0.01	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Log fund nb. of past investments	-0.04***	-0.03***	-0.03***	-0.03***	-0.02***	-0.01**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Follow-up fund dummy	0.00	0.00	0.04***	0.02***	0.02***	0.01
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund size	0.02***	0.02***	0.01***	-0.01***	-0.01***	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Constant	0.42***	0.42***	0.44***	0.33***	0.51***	0.45***
	(0.01)	(0.01)	(0.01)	(0.07)	(0.04)	(0.01)
Vintage fixed effects	Yes	No	No	Yes	No	No
Inv. year fixed effects	No	Yes	No	No	Yes	No
VC firm fixed effects	No	No	Yes	Yes	Yes	No
Fund fixed effects	No	No	No	No	No	Yes
Observations	46673	46673	46673	46673	46673	46673
R^2	0.031	0.031	0.129	0.137	0.138	0.199

Panel C: Log number of prior rounds						
Log fund age	0.14***	0.10***	0.15***	0.16***	0.11***	0.14***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund nb. of exits	0.05***	0.07***	0.03***	0.03***	0.05***	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First-time fund × Log fund nb. of exits	0.06***	0.05***	-0.01	-0.00	-0.02**	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First-time fund	-0.10***	-0.09***	-0.10***	-0.06***	-0.04***	
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	
Log fund nb. of past investments	-0.04***	-0.04***	-0.05***	-0.05***	-0.05***	-0.02***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Follow-up fund dummy	0.02**	0.02***	0.04***	0.03***	0.03***	0.03**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund size	-0.01***	-0.01***	-0.01***	-0.04***	-0.04***	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Constant	0.64***	0.66***	0.66***	0.46***	0.42***	0.53***
	(0.01)	(0.02)	(0.02)	(0.09)	(0.05)	(0.01)
Vintage fixed effects	Yes	No	No	Yes	No	No
Inv. year fixed effects	No	Yes	No	No	Yes	No
VC firm fixed effects	No	No	Yes	Yes	Yes	No
Fund fixed effects	No	No	No	No	No	Yes
Observations	46673	46673	46673	46673	46673	46673
R^2	0.035	0.042	0.144	0.150	0.157	0.224

Table 5. Unconstrained funds and company maturity

This table replicates the results obtained in Table 4 on a sample of corporate venture capital and evergreen funds. A set of OLS regressions are run of proxies for company maturity on the log of fund age and a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. In columns (1) and (2), the dependent variable is the log of the number of years between the creation of the company and the investment. In columns (3) and (4), the dependent variable is a dummy equal to zero for companies classified by VentureXpert as "Startup/Seed" or "Early Stage" and one for later stages. In columns (5) and (6), the dependent variable is the log of the number of previous financing rounds (involving other funds) received by the company until the investment by a given fund. Standard errors are clustered by month and presented in parenthesis. ***, ** and * indicate significance at the 1, 5 and 10 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Log company age		Dev. stage dummy		Log nb. of prior rounds	
Log fund age	0.01	0.01	0.02	0.03	0.02	0.03
	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)	(0.03)
Log fund nb. of exits		-0.03		-0.04**		-0.04*
		(0.03)		(0.02)		(0.02)
First-time fund		0.03		-0.01		0.01
		(0.05)		(0.04)		(0.05)
Log fund nb. of past investments		0.01		0.02		0.00
		(0.02)		(0.01)		(0.02)
Follow-up fund dummy		0.01		0.00		0.03
		(0.04)		(0.03)		(0.03)
Log fund size		0.00		0.01		-0.01
		(0.02)		(0.02)		(0.02)
Constant	1.40***	1.35***	0.32**	0.31**	0.31	0.34
	(0.22)	(0.24)	(0.14)	(0.15)	(0.32)	(0.33)
Inv. year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4923	4923	4923	4923	4923	4923
R^2	0.208	0.208	0.228	0.229	0.246	0.247

Table 6. Fund horizon and patenting history

This table presents the results of an investment-level OLS regression of the prior patenting dummy on the log of fund age and a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. The sample is restricted to investments in companies that are matched with the NBER and HBS patent databases. The prior patenting dummy indicates whether the company has ever applied for any patent before receiving the investment. Several specifications are run with fund vintage, year, VC firm, and fund fixed effects. Standard errors are clustered by month and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

	Dependent variable: Prior patenting dummy					
Log fund age	0.12***	0.05***	0.12***	0.12***	0.05***	0.11***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Log fund nb. of exits	0.03***	0.03***	0.01	0.02**	0.02*	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
First-time fund × Log fund nb. of exits	-0.03**	-0.01	-0.02	-0.04**	-0.02	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
First-time fund	0.02	0.02	-0.10***	-0.03*	-0.02	
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	
Log fund nb. of past investments	-0.02***	-0.02***	-0.02***	-0.01**	-0.01**	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Follow-up fund dummy	-0.02*	-0.01	0.02	0.01	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Log fund size	-0.02***	-0.02***	0.02***	-0.01**	-0.01***	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	
Constant	0.45***	0.51***	0.33***	0.40***	0.60***	0.35***
	(0.02)	(0.02)	(0.02)	(0.14)	(0.22)	(0.02)
Vintage fixed effects	Yes	No	No	Yes	No	No
Inv. year fixed effects	No	Yes	No	No	Yes	No
VC firm fixed effects	No	No	Yes	Yes	Yes	No
Fund fixed effects	No	No	No	No	No	Yes
Observations	13365	13365	13365	13365	13365	13642
R^2	0.068	0.087	0.155	0.170	0.188	0.260

Table 7. Fund horizon and increase in patent count

This table presents the results of the following company × year regression (investment made up until December 2006 are included):

$$PC_{j,t+k} = \alpha_0 + \alpha_1 Age_{i,t} + \alpha_2 F_{i,t} + \alpha_3 C_{j,t} + \sum_{k=-3}^{5} \lambda_k Y_{t+k} + \sum_{k=-3}^{5} \beta_k Y_{t+k} \times Age_{i,t} + \sum_{k=-3}^{5} \delta_k Y_{t+k} \times F_{i,t} + \sum_{k=-3}^{5} \theta_k Y_{t+k} \times C_{j,t} + \epsilon_{i,j,t}$$

$PC_{j,t+k}$ is successively the log of one plus the number of patent applications and the log one plus the number of scaled patent applications by company j in year k around the investment year t. Y_{t+k} is a dummy equal to one in the k^{th} year around the investment of fund i in company j which occurs in year t. $Age_{i,t}$ is the log of the age of fund i at the time of the investment. $F_{i,t}$ is a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. $C_{j,t}$ is a vector of company-level controls, including the log of company age, stat, and sector dummies. Standard errors are clustered at the company level. Panel A the results of the specifications using company fixed effects, while Panel B includes company-level controls (age, sector, and state of incorporation). Standard errors are clustered by company and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

PANEL A: Within company

	Log patents + 1			Log scaled patents + 1		
Log fund age	0.14***	0.03***	0.15***	0.08***	0.02***	0.09***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year -3 × Log fund age	0.05***	0.05***	0.06***	0.02***	0.02***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year -2 × Log fund age	0.06***	0.06***	0.06***	0.03***	0.03***	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year -1 × Log fund age	0.04***	0.04***	0.04***	0.02***	0.02***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year +1 × Log fund age	-0.07***	-0.07***	-0.07***	-0.04***	-0.04***	-0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year +2 × Log fund age	-0.10***	-0.10***	-0.08***	-0.06***	-0.06***	-0.05***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year +3 × Log fund age	-0.11***	-0.11***	-0.07***	-0.06***	-0.06***	-0.05***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year +4 × Log fund age	-0.14***	-0.14***	-0.09***	-0.08***	-0.08***	-0.06***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year dummies × Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year dummies × Company controls	No	No	No	No	No	No
Company fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	No	Yes	No	No	Yes	No
Vintage fixed effects	Yes	No	No	Yes	No	No
VC firm fixed effects	Yes	Yes	No	Yes	Yes	No
Fund fixed effects	No	No	Yes	No	No	Yes
Observations	106925	106925	106925	106925	106925	106925
R^2	0.394	0.398	0.396	0.414	0.418	0.417

PANEL B: Controlling for company's observable characteristics

	Log patents + 1			Log scaled patents + 1		
Log fund age	0.03**	0.04***	0.04***	0.01	0.02***	0.03***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year -3 × Log fund age	0.04***	0.04***	0.05***	0.02**	0.02**	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year -2 × Log fund age	0.04***	0.04***	0.04***	0.02***	0.02***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year -1 × Log fund age	0.02	0.02	0.02**	0.01	0.01	0.01*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year +1 × Log fund age	-0.05***	-0.05***	-0.05***	-0.03***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Inv. year +2 × Log fund age	-0.07***	-0.07***	-0.05***	-0.04***	-0.04***	-0.03***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year +3 × Log fund age	-0.08***	-0.08***	-0.04***	-0.05***	-0.05***	-0.03***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year +4 × Log fund age	-0.11***	-0.11***	-0.06***	-0.07***	-0.07***	-0.04***
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
Inv. year dummies × Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year dummies × Company controls	Yes	Yes	Yes	Yes	Yes	Yes
Company fixed effects	No	No	No	No	No	No
Inv. year fixed effects	No	Yes	No	No	Yes	No
Vintage fixed effects	Yes	No	No	Yes	No	No
VC firm fixed effects	Yes	Yes	No	Yes	Yes	No
Fund fixed effects	No	No	Yes	No	No	Yes
Observations	95060	95060	95060	95060	95060	95060
R^2	0.145	0.146	0.180	0.142	0.143	0.181

Table 8. Fund horizon and increase in citation count

This table presents the results of the following patent-level regression (investment made up until December 2006 are included):

$$CC_{j,t+k} = \alpha_0 + \alpha_1 Age_{i,t} + \alpha_2 F_{i,t} + \alpha_3 C_{j,t} + \sum_{k=-3}^{5} \lambda_k Y_{t+k} + \sum_{k=-3}^{5} \beta_k Y_{t+k} \times Age_{i,t} + \sum_{k=-3}^{5} \delta_k Y_{t+k} \times F_{i,t} + \sum_{k=-3}^{5} \theta_k Y_{t+k} \times C_{j,t} + \epsilon_{i,j,t}$$

$CC_{j,t+k}$ is successively the log of one plus the number of citations and the log of one plus the number of scaled citations received by a patent applied by company j in year k around the investment year t. Y_{t+k} is a dummy equal to one in the k^{th} year around the investment of fund i in company j which occurs in year t. $Age_{i,t}$ is the log of the age of fund i at the time of the investment. $F_{i,t}$ is a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. $C_{j,t}$ is a vector of company-level controls, including the log of company age, state, and sector dummies. Standard errors are clustered at the company level. Panel A shows the results of the specifications using company fixed effects, while Panel B includes company-level controls (age, sector, and state of incorporation). Standard errors are clustered by company and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

PANEL A: Within company

	Log citations + 1			Log scaled citations + 1		
Log fund age	-0.11***	0.06**	-0.12***	-0.07***	0.03**	-0.08***
	(0.04)	(0.02)	(0.04)	(0.02)	(0.01)	(0.02)
Inv. year -3 × Log fund age	0.19***	0.23***	0.17***	0.08***	0.10***	0.07**
	(0.05)	(0.06)	(0.05)	(0.03)	(0.03)	(0.03)
Inv. year -2 × Log fund age	0.13***	0.16***	0.13***	0.04**	0.06***	0.05**
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
Inv. year -1 × Log fund age	0.06**	0.08***	0.06**	0.02	0.03	0.01
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Inv. year +1 × Log fund age	-0.01	-0.02	-0.02	0.00	-0.00	-0.00
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)
Inv. year +2 × Log fund age	-0.07**	-0.09***	-0.07**	-0.03	-0.04**	-0.04**
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Inv. year +3 × Log fund age	-0.13***	-0.16***	-0.10**	-0.07***	-0.08***	-0.06**
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
Inv. year +4 × Log fund age	-0.17***	-0.21***	-0.15***	-0.09***	-0.11***	-0.10***
	(0.05)	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)
Inv. year dummies × Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year dummies × Company controls	No	No	No	No	No	No
Company fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	No	Yes	No	No	Yes	No
Vintage fixed effects	Yes	No	No	Yes	No	No
VC firm fixed effects	Yes	Yes	No	Yes	Yes	No
Fund fixed effects	No	No	Yes	No	No	Yes
Observations	119064	119064	119064	118959	118959	118959
R^2	0.441	0.444	0.443	0.401	0.403	0.403

PANEL B: Controlling for company's observable characteristics

	Log citations + 1			Log scaled citations + 1		
Log fund age	-0.02	0.03	0.00	-0.04*	0.02	-0.02
	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)
Inv. year -3 × Log fund age	0.17**	0.23***	0.18***	0.04	0.07*	0.05
	(0.07)	(0.07)	(0.06)	(0.04)	(0.04)	(0.03)
Inv. year -2 × Log fund age	0.14***	0.19***	0.13***	0.04	0.06**	0.04*
	(0.04)	(0.05)	(0.04)	(0.03)	(0.03)	(0.02)
Inv. year -1 × Log fund age	0.02	0.06	0.03	-0.01	0.01	-0.01
	(0.04)	(0.04)	(0.03)	(0.02)	(0.02)	(0.02)
Inv. year +1 × Log fund age	0.00	-0.01	-0.01	0.02	0.01	0.00
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)
Inv. year +2 × Log fund age	-0.03	-0.08*	-0.06*	-0.02	-0.04	-0.04**
	(0.05)	(0.05)	(0.03)	(0.03)	(0.03)	(0.02)
Inv. year +3 × Log fund age	-0.11**	-0.18***	-0.09**	-0.06**	-0.09***	-0.07***
	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)	(0.02)
Inv. year +4 × Log fund age	-0.07	-0.17***	-0.09**	-0.06*	-0.10***	-0.08***
	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)	(0.03)
Inv. year dummies × Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year dummies × Company controls	Yes	Yes	Yes	Yes	Yes	Yes
Company fixed effects	No	No	No	No	No	No
Inv. year fixed effects	No	Yes	No	No	Yes	No
Vintage fixed effects	Yes	No	No	Yes	No	No
VC firm fixed effects	Yes	Yes	No	Yes	Yes	No
Fund fixed effects	No	No	Yes	No	No	Yes
Observations	110743	110743	110743	110648	110648	110648
R^2	0.135	0.153	0.183	0.101	0.108	0.149

Table 9. Fund horizon and market conditions

This table presents the results of an investment-level OLS regression of the proxies for company maturity on the log of fund age interacted with measures of market conditions. In Panel A, *Hot market conditions* is a dummy equal to one (zero) if past twelve month returns on the Nasdaq Composite Index lie in the top (bottom) tertile of the sample distribution. In Panel B, *Median market-wide time to exit* is the age of companies that were exited through an IPO or a M&A in the past twelve months. All specifications include a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. In columns (1) and (2), the dependent variable is the log of the number of years between the creation of the company and the investment. In columns (3) and (4), the dependent variable is a dummy equal to zero for companies classified by VentureXpert as "Startup/Seed" or "Early Stage" and one for later stages. In columns (5) and (6), the dependent variable is the log of the number of previous financing rounds (involving other funds) received by the company until the investment by a given fund. Standard errors are clustered by month and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Log company age		Dev. stage dummy		Log nb. of prior rounds	
Panel A: Hot Market Conditions						
Log fund age	0.21***	0.17***	0.10***	0.08***	0.13***	0.16***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
Log fund age × Hot market conditions	-0.05**	-0.04**	-0.02***	-0.02***	-0.06***	-0.06***
	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)
Hot market conditions	0.01	0.01	0.02	0.03	-0.01	0.01
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)
Fund level controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC firm fixed effects	No	Yes	No	Yes	No	Yes
Observations	33240	33240	33240	33240	33240	33240
R^2	0.043	0.173	0.033	0.148	0.043	0.169
Panel B: Time to exit						
Log fund age	0.06*	0.03	0.02	-0.01	-0.05**	-0.04
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
Log fund age × Median market-wide time to exit	0.02***	0.02***	0.01***	0.01***	0.02***	0.03***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Median market-wide time to exit	-0.02	-0.01	-0.01	-0.01	-0.02	-0.02
	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Fund level controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC firm fixed effects	No	Yes	No	Yes	No	Yes
Observations	46603	46603	46603	46603	46603	46603
R^2	0.040	0.160	0.032	0.139	0.042	0.158

Table 10. Fund horizon interacted with VC firm experience

This table presents the results of an investment-level OLS regression of the proxies for company maturity on the log of fund age interacted with alternatively the *log VC firm age*, i.e., the log of the number of years since the VC firm has been operating (Panel A), the *log VC firm number of investments*, i.e., the log of the number of investments made by the GP (VC firm) before raising the fund (Panel B) and the *log VC firm nb. of funds raised*, i.e., the number of funds raised by the VC firm prior to the investment (Panel C). All specifications include a vector of fund-level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. In columns (1) and (2), the dependent variable is the log of the number of years between the creation of the company and the investment. In columns (3) and (4), the dependent variable is a dummy equal to zero for companies classified by VentureXpert as "Startup/Seed" or "Early Stage" and one for later stages. In columns (5) and (6), the dependent variable is the log of the number of previous financing rounds (involving other funds) received by the company until the investment by a given fund. Standard errors are clustered by month and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)
	Log company age		Dev. stage dummy		Log nb. of prior rounds	
Panel A: Log VC firm age						
Log fund age	0.14***	0.10***	0.05***	0.03***	0.07***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund age × Log VC firm age	0.02***	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log VC firm age	-0.01**	-0.01	-0.00	-0.01***	-0.00	-0.00
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Fund level controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC firm fixed effects	No	Yes	No	Yes	No	Yes
Observations	46673	46673	46673	46673	46673	46673
R^2	0.040	0.160	0.032	0.139	0.042	0.157
Panel B: Log VC firm number of investments						
Log fund age	0.14***	0.10***	0.06***	0.04***	0.08***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund age × Log VC firm nb. of past inv.	0.02***	0.01***	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log VC firm nb. of past inv.	-0.02***	-0.02***	-0.01*	-0.02***	-0.00	-0.01
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)
Fund level controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC firm fixed effects	No	Yes	No	Yes	No	Yes
Observations	46673	46673	46673	46673	46673	46673
R^2	0.041	0.160	0.032	0.139	0.042	0.157
Panel C: Log VC firm nb. of funds raised						
Log fund age	0.14***	0.08***	0.06***	0.04***	0.08***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Log fund age × Log VC firm nb. of funds raised	0.04***	0.04***	0.02***	0.02***	0.02***	0.04***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Log VC firm nb. of fund raised	-0.06***	-0.10***	-0.01	-0.03**	-0.02**	-0.06***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
Fund level controls	Yes	Yes	Yes	Yes	Yes	Yes
Inv. year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
VC firm fixed effects	No	Yes	No	Yes	No	Yes
Observations	46673	46673	46673	46673	46673	46673
R^2	0.041	0.160	0.032	0.139	0.041	0.157

Table 11. Fund horizon, VC firm experience and exits

This table presents the results of an investment-level OLS regression of the successful exit dummy on the log of fund age, and a a vector of fund level controls including (i) the log number of investments exited by the fund, (ii) the log number of past investments made by the fund, (iii) a dummy indicating whether the VC firm has raised a follow-up fund at the time of the investment, (iv) the log of fund size, and (v) a dummy for first-time funds. In columns (2) to (4), the log of fund age is interacted with successively the *log VC firm age*, i.e., the log of the number of years since the VC firm has been operating (column 2), the *log VC firm number of investments*, i.e., the log of the number of investments made by the GP (VC firm) before raising the fund (column 3) and the *log VC firm nb. of funds raised*, i.e., the number of funds raised by the VC firm prior to the investment (column 4). Standard errors are clustered by month and presented in parenthesis. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

	(1)	(2)	(3)	(4)
	Dependent variable: successful exit dummy			
Log fund age	0.024***	0.011	0.012*	0.006
	(0.006)	(0.007)	(0.007)	(0.007)
Log fund age × Log VC firm age		0.005***		
		(0.002)		
Log fund age × Log VC firm nb. of past inv.			0.005***	
			(0.002)	
Log fund age × Log VC firm nb. of funds raised				0.015***
				(0.004)
Log VC firm age		-0.003		
		(0.004)		
Log VC firm nb. of past inv.			-0.003	
			(0.004)	
Log VC firm nb. of funds raised				-0.026**
				(0.013)
Log fund nb. of exits	-0.010**	-0.011**	-0.011**	-0.012**
	(0.005)	(0.005)	(0.005)	(0.005)
First-time fund	0.001	0.009	0.007	-0.003
	(0.007)	(0.012)	(0.011)	(0.011)
Log fund nb. of past investments	-0.002	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Follow-up fund dummy	-0.014**	-0.014**	-0.014**	-0.015**
	(0.006)	(0.006)	(0.006)	(0.006)
Log fund size	-0.004	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.417***	0.416***	0.415***	0.416***
	(0.033)	(0.034)	(0.033)	(0.033)
Inv. year fixed effects	Yes	Yes	Yes	Yes
VC firm fixed effects	Yes	Yes	Yes	Yes
Observations	46673	46673	46673	46673
R^2	0.137	0.138	0.138	0.138

Table 12. Aggregate dry powder and company maturity

This table presents a timeseries OLS regression of the average company age in a given quarter on lagged measures of aggregate funds available for private equity investments (dry powder) including the maturity of the aggregate dry powder and the log of the total amount. In columns (1) and (2), these measures are computed based on the universe of venture capital funds. In columns (2) and (3), they are computed based on the universe of buyout (BO) funds. In Panel A, the dependent variable is the average age of companies receiving their first venture capital investment in this quarter. In Panel B, the dependent variable is the average age of companies receiving any venture capital investment in this quarter. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

Panel A: Age of companies receiving their first VC investment				
Dry powder maturity	0.32***	0.25**		
	(0.09)	(0.10)		
Log dry powder	-0.04	-0.07		
	(0.08)	(0.08)		
Dry powder maturity, BO funds			0.31***	0.29***
			(0.11)	(0.11)
Log dry powder, BO funds			0.03	-0.00
			(0.06)	(0.06)
Age of companies receiving their first inv., CVC and Evergreen		0.15**		0.14**
		(0.07)		(0.06)
Past year Nasdaq cumulative returns	-0.22	-0.27	-0.36	-0.38
	(0.33)	(0.33)	(0.33)	(0.33)
Observations	120	120	120	120
R^2	0.131	0.165	0.170	0.203

Panel B: Age of companies receiving any VC investment				
Dry powder maturity	0.46***	0.38***		
	(0.06)	(0.07)		
Log dry powder	0.05	0.03		
	(0.06)	(0.06)		
Dry powder maturity, BO funds			0.34***	0.31***
			(0.08)	(0.08)
Log dry powder, BO funds			0.12**	0.07
			(0.05)	(0.05)
Age of companies receiving their first inv., CVC and Evergreen		0.14**		0.19***
		(0.06)		(0.05)
Past year Nasdaq cumulative returns	-0.17	-0.22	-0.36	-0.41*
	(0.24)	(0.24)	(0.25)	(0.24)
Observations	120	120	120	120
R^2	0.444	0.470	0.417	0.478

Table 13. Industry life cycle and company maturity

This table presents a cross-sectional industry-level OLS regression of the average company age receiving venture capital money in a given industry on the length of firms life cycle in this industry. In columns (1) and (2), the length of the life cycle is measured as the industry average number of years between firms creation and their exit through an IPO or an acquisition. In columns (2) and (3), it is measured as the average number of years between firms creation and exit, adjusted for cohort effects. In Panel A, the dependent variable is the average age of companies receiving their first venture capital investment in this industry. In Panel B, the dependent variable is the average age of companies receiving any venture capital investment in this industry. ***, **, and * indicate significance at the 1, 5, and 10 percent level.

Panel A: Age of companies receiving their first VC investment				
Age at exit	0.47***	0.36***		
	(0.05)	(0.05)		
Cohort adjusted age at exit			0.33***	0.26***
			(0.06)	(0.05)
Log nb. of investments	-0.29**	-0.20	-0.39***	-0.26**
	(0.14)	(0.12)	(0.15)	(0.13)
Age of companies receiving their first inv., CVC and Evergreen		0.24***		0.26***
		(0.02)		(0.02)
Observations	423	423	423	423
R^2	0.184	0.376	0.090	0.327
Panel B: Age of companies receiving any VC investment				
Age at exit	0.42***	0.33***		
	(0.04)	(0.04)		
Cohort adjusted age at exit			0.30***	0.24***
			(0.05)	(0.04)
Log nb. of investments	-0.18	-0.11	-0.27**	-0.17
	(0.12)	(0.11)	(0.13)	(0.11)
Age of companies receiving their first inv., CVC and Evergreen		0.21***		0.23***
		(0.02)		(0.02)
Observations	423	423	423	423
R^2	0.186	0.378	0.087	0.325