Mutual Fund Investments in Private Firms

Sungjoung Kwon
LeBow College of Business, Drexel University
sk3392@drexel.edu

Michelle Lowry
LeBow College of Business, Drexel University
michelle.lowry@drexel.edu

Yiming Qian
Tippie College of Business, University of Iowa
yiming-qian@uiowa.edu

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Abstract:
Historically a key advantage of being a public firm was broader access to capital, from a disperse group of shareholders. In recent years, such capital has increasingly become available to private firms as well. We document a dramatic increase over the past twenty years in the number of mutual funds participating in private markets and in the dollar value of these private firm investments. On the demand side, the greater availability of capital changes the trade-off between private and public listing status: mutual fund investments enable companies to stay private significantly longer. On the supply side, mutual funds have benefited from these investments in terms of high returns relative to various benchmarks, diversification relative to these same benchmarks, and possibly higher allocations at the time of the IPO.

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1. Introduction

While going public is without question a watershed event in the life of a firm, the lines between private and public listing status have become increasingly blurred in recent years. The number of publicly listed companies has decreased, and at the same time private companies are increasingly raising funding from investors who traditionally focused only on public companies. These changing dynamics affect multiple parties: firms who are faced with potential changes in both sources of capital and costs of capital, investors who face changes in their investment opportunity set, and regulators who are faced with policies that are largely based on a relatively strict line between public and private listing status.

Mutual funds are recognized as one of the largest investors in public firms, but have increasingly extended their investment portfolios into private firms. The aggregate valuation of mutual funds' investments in private firms increased from $16 million in 1995 to over $8 billion in 2015, and thirty-nine percent of venture-backed IPOs in 2016 had received mutual fund financing prior to going public. As an investor in private firms, mutual funds are unique along several dimensions. They are willing to invest without strong control rights (see, e.g., Chernenko et al, 2017), they have limited experience evaluating private firms, and they face an investment horizon that is flexible (e.g., due to the lack of a specific fund life) but uncertain (e.g., due to potential investor liquidity demands at any point in time). These qualities distinguish mutual funds from the more traditional investors in the private firm space, e.g., venture capitalists, private equity firms, and corporations.

The first objective of this paper is to examine the growing tendency of mutual funds to invest in private firms. We systematically document the extent to which both an increasing number of mutual funds are investing in private firms and a greater number of private firms are receiving such financing. In addition, we also examine the types of firms that receive this type of financing.

Second, we examine the effects of these investments on firms. We conjecture that private

firms' demands for mutual fund capital reflect their pursuit of certain benefits of public listing without the associated costs. In a survey by Brau and Fawcett (2006), companies cite provision of capital, increased liquidity, and a more disperse shareholder base as key reasons to go public; mutual fund investments can potentially provide all these benefits to companies while they are still private. To the extent that the increased capital enables companies to stay private longer, the companies can postpone many of the costs associated with public listing, for example regulatory requirements, increased disclosures that may lessen competitive advantages (Beyer et al, 2010), and pressure from investors for short-term results (Asker et al, 2015). This enables companies to achieve a larger scale before going public, which Gao, Ritter and Zhou (2013) suggest is particularly important in today's world of increased economies of scale and more international supply chains.[1]

Third, we consider the factors that lead mutual funds to supply this capital. We hypothesize that funds' willingness to supply capital to this set of private firms relates directly to their objective of maximizing risk-adjusted returns. Investments in private firms provide value if they provide either higher returns or a source of diversification, relative to public firms. The dramatic decrease in the number of public firms over the last decade means that investment opportunities for mutual funds in the public sector have become more limited (Grullon, Larkin, and Michaely, 2017; Doidge, Karolyi and Stulz, 2017), potentially leading them to seek out alternative investment opportunities. We also consider the possibility that investments in firms prior to the IPO contribute toward greater share allocations when the firms go public. Perhaps not surprisingly given the large one-day returns when IPO stocks start trading, prior literature finds that institutional investors engage in many forms of quid pro quo activities as ways to garner such allocations (see, e.g., Reuter (2006), Ritter and Zhang (2007), Goldstein, Irvine, and Puckett (2011), and Nimalendran, Ritter, Zhang (2007)).

[1] As discussed in more detail in the body of the paper, a variety of institutional factors limit companies' ability to stay private indefinitely. VCs have defined fund lives that require them to liquidate investments, firm employees demand liquidity for example by selling shares and exercising options, and mutual fund investors have regulatory limits on the amount of capital in illiquid assets.

To investigate the extent of mutual fund investments across a broad sample of private firms, we hand-collect detailed holdings data on 14 mutual fund families. The funds in our sample include predominantly the largest fund families (e.g., Fidelity, Blackrock, and T. Rowe Price) as larger families are significantly more likely to invest in private firms. Through an intensive data-gathering process, we determine that 149 funds across these 14 families held shares in venture-backed private firms, over the 1995 – 2016 period. This practice has become increasingly widespread: less than 14 funds invested in private companies each year through 2000, compared to over 90 unique funds in 2014 and 2015. This trend potentially reflects increases in the demand and/or supply of mutual fund capital. Increases in demand would be consistent with private firms seeking to stay private longer as a way to avoid the regulatory and shareholder-induced pressures of being a public firm. Increases in supply would be consistent with lower costs of learning about private firms, and potentially by the search for higher returns by diversifying into new asset classes.

These 149 mutual funds invested in 270 unique companies during 1995-2016. As a basis of comparison, among the subset of VC-backed IPO firms that went public in an IPO in 2015 and 2016, approximately 30% received mutual fund financing prior to going public. However not surprisingly, these 270 companies represent a much lower fraction of all firms with venture financing. Mutual fund investments are concentrated among companies at later stages of development, a pattern that is consistent with fund managers' liquidity concerns, with fund managers' expertise, and with later-stage firms' greater capital demands (which more likely exceed what venture capitalists are willing to provide). Results also suggest that mutual funds rely on the certification effects of intermediaries, for example concentrating investments in firms backed by higher quality VCs.

Our findings provide strong support for the conjecture that mutual funds mitigate key constraints of private firms. Mutual fund investments serve to provide both liquidity and new capital. Across these two, the provision of new capital is dominant, with the majority of mutual fund investments into private firms representing primary shares, i.e., new money for the company, as

opposed to secondary shares. The amount of capital provided by mutual funds is substantial. Among rounds in which mutual funds participated, the funds provide an average 38% of the total financing raised (median = 33.3%), over the 2011 – 2016 period. Moreover, the capital provided by mutual funds appears to be incremental to that provided by the VCs, i.e., not to represent a substitute in the sense of enabling VCs to stop funding the company at an earlier point.

We next seek to examine the ways in which this added capital influences the underlying firms. We structure this analysis around the likely premise that the relation includes both a selection effect and a treatment effect. The selection effect represents the tendency of funds to invest in later stage companies backed by higher quality VCs. This effect suggests that the companies with mutual fund investment will be more likely to successfully exit, a prediction for which we find strong support. The treatment effect represents the causal effects of these investments. Building on our earlier finding that mutual funds provide incremental capital to these companies (i.e., beyond what VCs would be willing to provide), we conjecture that mutual fund investments should both enable companies to stay private longer and enable companies to grow to a sufficiently large scale that they can go public via IPO (rather than being acquired).

To isolate the causal effects of mutual funds' investments in private firms, we use an instrument that captures relationships as conduits of information (see, e.g., Cohen, Frazzini and Malloy (2010), Engelberg, Gao and Parsons (2012)). Consistent with academic literature on the value of connections, conversations with both mutual fund managers and venture capitalists highlight the importance of relationships as influencing these investments. We define a VC as having a prior mutual fund relationship if another private company in the VC's portfolio had previously received an investment from a mutual fund. We conjecture that the increased communication that follows from this investment increases the probability that a mutual fund becomes aware of subsequent private

companies backed by the same VC.[2] Consistent with this intuition, we find that these VC-mutual fund connections strongly predict subsequent mutual fund investments.

Using this instrument, a wide array of regression specifications suggests that mutual fund financing enables companies to stay private longer. Among those companies that successfully exit, mutual fund financing enables companies to stay private 1.8 years longer. Moreover, our findings indicate that companies with mutual fund financing are more likely to go public but less likely to be acquired, an insightful difference given the greater stage of development of firms going public.

Finally, the last portion of the paper examines the extent to which the suppliers of this capital have benefited from expanding their investment portfolios into private firms, from a more traditional focus on solely public firms. Potential benefits include higher returns and greater diversification. Among the subsample of companies that received their first VC financing during 2001 – 2010 (thus allowing sufficient time to exit), 43% of those in which mutual funds invested exited via IPO. Across these firms that ultimately went public via IPO, the median fund investment earned raw returns of 125.8%, which equates to a monthly return of 4.1%. Moreover, the diversification benefits of these investments are nontrivial: the correlation between the average mutual fund investment in a private firm and the value-weighted index (equal-weighted) is only 10% (14%).

Our results also suggest that mutual funds that invest prior to the IPO are more likely to obtain allocations in the IPO. In the small sample for which we have allocation data, fund families that invested prior to the IPO receive an allocation in the IPO in 64% of cases, compared to a much lower 21% of matched offerings in which the fund family did not invest pre- IPO. Conditional on receiving an IPO allocation, the median percent of IPO shares allocated to families with (without) pre-IPO investments is 4.1% (3%). In a related note, we find little evidence that mutual funds benefit along the more perverse dimension of strategically valuing these investments while the firms are still

[2] See, e.g., https://www.cbinsights.com/blog/mutual-fund-vc-syndicates/

private. While differences in mutual funds' valuations of these private firms have received substantial attention in the popular press, we find that these cases are not common. Among those private firms held by more than one mutual fund, the median firm has zero dispersion in valuations.

Our findings relate to several streams of literature. First, our finding that firms are increasingly employing mutual fund capital as a way to stay private longer is illuminating when viewed as part of the broader debate on the benefits and costs of being a public firm. A revealed preference argument suggests that firms perceive the net benefits of being a public firm to have decreased. This conclusion is consistent with the fact that many of the factors that have traditionally motivated firms to publicly list are increasingly available to firms while they are still private: capital, liquidity, a dispersed shareholder base. While Brau and Fawcett (2006), Brav (2009) and Gilje and Taillard (2016) provide evidence on these benefits of public listing, and Iliev (2010) and Asker, Farre-Mensa, and Ljungqvist (2015) provide evidence on the costs of public listing, our evidence suggests that these benefits and costs are changing in systematic ways.

Second and more broadly, our paper contributes to the growing literature documenting substantial changes in the IPO market. Gao et al. (2013) highlight an increased propensity of private firms to be acquired rather than go public, particularly among small firms, and Doidge et al. (2017) focus on changes in non-US firms' decisions regarding the market on which to list. More closely related to our paper are two contemporaneous papers by Ewens and Farre-Mensa (2017) and Chernenko, Lerner and Zeng (2017). Ewens and Farre-Mensa document the large increases in capital available to late-stage startup firms, much of it from private equity funds and corporations. Chernenko et al. (2017) analyze the growing tendency of mutual funds to invest in a subset of highly valued start-ups commonly referred to as unicorns, though unlike us they focus on the corporate governance provisions of these investments. In aggregate, the trends documented in these papers have contributed to a lower number of publicly traded firms, as analyzed by Doidge et al. (2017) and Grullon et al. (2017). Mutual funds' increasing tendency to invest in private firms has coincided

with these decreases in public firm investment opportunities.

Finally, our paper highlights the importance of networks and connections across different types of intermediaries. Several papers have established the importance of networks within the venture capital industry. Hochberg, Ljungqvist and Lu (2007) find that more centralized venture capitalists perform significantly better, and Gorman and Sahlman (1989) and Sahlman (1990) discuss the ways in which VCs rely on their connections with head hunters, patent lawyers, and investment bankers, among others, to increase the company's likelihood of success. Our findings suggest that relationships between venture capitalists and mutual funds are becoming increasingly important.

2. Data

2.1 Private firm sample

Our sample consists of private firms that received venture capital backing, as listed in the Thomson Reuters Private Equity database (formerly VentureXpert), over the 1990 – 2016 period.[3] We restrict the sample of VC-backed companies along several dimensions.[4] Firms must be private and US-based, and firms must receive an investment from at least one fund with the investment type 'Venture Capital', thereby excluding firms whose financing is solely real estate, mezzanine finance, or private equity. We require these companies to be founded after 1980, and to have the first venture capital funding round in 1990 or later. Our final sample includes 28,516 VC-backed private firms. We obtain the industry of each firm, and for each financing round we obtain the date, the dollar amount

[3] We evaluated potential survivorship-bias related issues in the Thomson Reuters data, by comparing our dataset with a VentureXpert download from 2005. We compare the data on a variety of dimensions, and find no evidence that any such biases are influencing our results. Kaplan and Lerner (2016) provide more detail on various sources of venture capital data, but conclude that no other database is clearly superior for the types of data we are using.

[4] We focus on private companies with venture backing for several reasons. First, many non-VC backed private companies have no definite plan for exit, meaning we are unable to assess the effects of mutual fund investment on a company's probability of success or time spent in private status. Second, information on key equity investors is less available for non-VC backed companies. Third, many mutual fund managers focus private firm investments on firms backed by venture capital. For example, 81% of Fidelity Contrafund's 21 restricted holdings in 2015 represent VC-backed companies. We omit the small number of companies that received mutual fund financing prior to their first VC round.

invested, and the identity of the investors. From the SDC New Issues Database and the SDC Mergers and Acquisitions Database, we determine exit outcomes. For each private firm in our sample, we determine whether the firm went public or was acquired.

Several analyses focus on company outcomes, which we define as exiting via IPO, exiting via acquisition, or failure. Firms are classified as failed if they have not exited and have not received a funding round for at least four years prior to the end of the sample period.

Looking at Panel A of Table 1, Column 1 shows the annual number of companies receiving VC financing for the first time each year, and Column 2 shows the subset that subsequently exited via either IPO or acquisition. Columns 7 and 8, in Panel B, show the number of exits by exit year.

2.2. Mutual Fund Holdings

We manually collect data on mutual funds' holdings in private firms for the period 1995-2016. The SEC requires mutual funds to disclose their complete portfolio holdings, with holdings in private firms listed as restricted securities.[5] Because standard data sources such as the CRSP Mutual Fund database and Thomson-Reuters Mutual Fund Holdings database do not include many private firm holdings, we collect data directly from EDGAR. Electronic filings are available from EDGAR starting around 1995, with mutual funds disclosing their portfolio holdings semi-annually through 2004, and at a quarterly interval since 2005.[6] To ensure consistency across our entire sample period, we collect holdings data semi-annually for all years, from Form N-30D for the period 1995-2004 and from form N-Q for the period 2005-2016. Appendix I provides an example.

Due to the extremely high costs of collecting data on every mutual fund, we collect data on a subset of funds. Because our primary interest is to characterize the trends in mutual fund investments and to assess the impact of mutual fund investments on private companies, we seek to identify fund

[5] The SEC defines restricted securities as securities acquired in an unregistered, private sale from the issuing company or from an affiliate of the issuer.

[6] Starting from May 2004, the SEC requires mutual funds to file Form N-CSR (Certified Shareholder Report) at the end of the second and fourth fiscal quarters and Form N-Q (Quarterly Schedule of portfolio holdings) at the end of the first and third fiscal quarters (Agarwal et al., 2015).

families that have the willingness and infrastructure to invest in private companies. To identify such a subset, we first identify all IPOs between 2006 and 2015, excluding REITs, ADRs, banks, utilities, previous LBO firms, and offerings with an offer price less than $5. We then search by IPO company name through the universe of mutual fund filings over this same period, to determine which mutual funds owned any of these firms prior to the IPO. Filings are made at the CIK level (where each CIK generally includes multiple funds). We identify 91 CIKs for which at least one mutual fund invests in a company prior to its IPO; in total these CIKs include approximately 1,500 funds.[7]

Across these 91 CIKs, 72 are associated with open-end funds in the Thomson-Reuters Mutual Fund Holdings database. Among these 72 CIKs, 68 CIKs are associated with funds in decile ten (largest), 3 with funds in decile nine, and 1 with a fund in decile seven (where the deciles are based on grouping the 12,956 unique funds listed in Thomson-Reuters by management company, and ranking management companies into deciles according to total assets).[8] In sum, larger fund families are substantially more likely to invest in private companies, a finding that is consistent with both Chernenko et al. (2017) and with a 2016 Morningstar Report.[9] Such families arguably have superior abilities and/or resources to evaluate this set of more informationally opaque companies.

We collect mutual fund holdings for a representative subsample of these 72 CIKs. Consistent with the above-described distribution of CIKs, we select 12 fund families from decile ten (Blackrock, Fidelity, Vanguard, etc.), one from decile nine (Wasatch), and one that is not in the CRSP Mutual Fund Database (Great-West Funds). This provides a sample of 48 CIKs across 14 different fund families. We extract information on each fund's holdings of restricted securities using Python as well as

[7] One potential concern is that this approach will fail to identify funds that have invested in private firms, but none of these firms have gone public. To assess the severity of this factor, we compare our list of mutual funds with those listed in the Wall Street Journal Startup Stock Tracker, which includes private firms held by mutual funds with valuations of $1 billion or more as of the end of 2016. Our algorithm captures all fund families included in this list.
[8] The matching of funds within these CIKs to Thomson-Reuters Mutual Fund Holdings deciles is based on the registrant fund within each CIK, as designated on the EDGAR filing. We do not include the CIKs associated with closed-end funds because these funds arguably have different investment objectives.
[9] Morningstar Manager Research, (2016). Unicorn hunting: mutual fund ownership of private companies is a relevant, but minor, concern for most investors. December 2016.

extensive hand collection and verification. We distinguish equity holding from debt holding, and we collect company names, number of shares, valuations, acquisition dates, acquisition costs, and security types. Additional details on this process, as well as the full list of mutual fund families for which we collect data, are provided in Appendix I. Table 1 describes the time-series of these investments.

For several analyses, we are interested in contrasting the capital provided by mutual funds versus VCs. For such purposes, we strive to match mutual fund investment with investment rounds in either the Thomson Reuters Private Equity database or CrunchBase. Thomson Reuters' coverage is more comprehensive in terms of the VC-backed company list, but it does not report round series information (series A, series B, etc.). In contrast, CrunchBase provides round series information, but the data are less comprehensive in the sense that they include fewer firms. As discussed further in later sections, we define a mutual fund investment to have been part of a funding round if the absolute value of the difference between the mutual fund's acquisition date (as reported in mutual fund filings) and the venture round date (as reported in either Thomson Reuters or CrunchBase) is less than 30 days.

2.3 Patent Data

The majority of the venture-backed firms in our sample are in technology-focused industries, where patenting tends to be important. Patent activity represents a strong metric of a firm's level of development, which is particularly important given the paucity of financial information for private firms. Following Denes (2017), we use Python scripts to download and extract patent data from USPTO (United States Patent and Trademark Office). Further details are provided in Appendix I.

There are two dates for each patent: application date and grant date. As noted by Lerner and Seru (2015), the patent literature has generally focused on analyzing patents by application year. The economic motivation for this measure is that firms tend to file for patents soon after the discoveries are made. However, we observe patent applications only if they are granted. Therefore, counting number of patents based on application year will mechanically create a truncation problem. Following Hall, Jaffe, and Trajtenberg (2001) and Bernstein (2015) among others, we correct this truncation bias by

scaling each patent by the average number of patents of all VC-backed companies in the same year and industry, using the Thomson Reuters industry groupings (shown in Table 2).

2.4 Descriptive Statistics

Descriptive statistics on our sample of 28,516 venture-backed companies are provided in Table 2, where the first column focuses on the 270 companies that received mutual fund financing, and the second column focuses on companies that did not receive such investment.

The first set of rows shows the characteristics of the VCs providing funding in the first round: VC firm age, the number of companies in which the VC invested during the past five years, and the number of companies funded by the VC that had an IPO or were acquired during the past five years. When there are multiple VCs in the first round, we take the average of these characteristics. These metrics are generally perceived to capture aspects of both VC and firm quality (see, e.g., Lerner (1994), Hochberg, Ljungqvist, and Lu (2007), Nahata (2008), Sorenson (2007)). Across all these measures, firms that are ultimately funded by mutual funds are backed by higher quality VCs during the first round of financing. This is consistent with our conjecture that mutual funds rely on the certification of an intermediary when selecting private companies in which to invest.

The second set of rows focuses on the extent of VC funding. Because we are interested in the decision of mutual funds to invest in firms, we measure these variables prior to the first mutual fund financing for the sample of 270 firms that received such financing, and as of the last VC round prior to exit (or the end of the sample period) for all other firms. This approach is based on the intuition that funds had the choice to invest in these other firms at each point in time (up to ultimate exit or to the last observed round), but never did. Rounds received represents the number of VC financing rounds, VC syndicate size represents the number of VCs that have invested in the firm, and amount raised represents the cumulative dollar funding from VCs, at these points in time. These measures all indicate that mutual funds are choosing to invest in firms in which VCs have made greater commitments.

The third set of rows shows measures of patenting activity. We find that companies with

mutual fund financing have applied for significantly more patents (where the set of patents is restricted to those that are ultimately granted) than those without: 6.7 versus 2.5 in raw terms, and 1.4 versus 0.5 after adjusting for year and industry. Similarly, firms with mutual fund financing are significantly more likely to have applied for a patent (which by definition is ultimately granted).

The fourth and fifth sets of rows shows the industry and geographical distribution of the two sets of firms, using industry definitions from Thomson Reuters. There is a marked concentration of mutual-fund backed firms in the biotech industry, and in California and to some extent Massachusetts. While VC-backed firms in general are more likely to be located in California or Massachusetts, the extent of concentration is even greater among the subset with mutual fund investment.

The sixth set of rows describes the outcomes of each group of firms. Those firms that receive mutual fund financing are significantly more likely to exit (49% vs. 27%), and in particular to exit via an IPO (31% vs. 5%). Interestingly, firms that receive mutual fund financing are less likely to exit via acquisition (18% vs. 23%), a finding that likely reflects the fact that IPO exits are substantially more profitable than acquisitions. Finally, the firms that receive mutual fund financing also remain private significantly longer, measured as time to exit from first VC round: 6.54 years versus 4.89 years. This could be driven by differences in the types of firms that go public or by the mutual fund financing enabling these firms to delay going public, an issue that we examine in detail in Section 6.

3. The time trend of mutual fund investments in private companies

Figures 1, 2, and 3 provide evidence on the prevalence of mutual fund financing in private companies, as well as the ways in which it has evolved over the past 20 years. Panel A of Figure 1 shows that there have been dramatic increases in the number of mutual funds participating in these private markets. Between 1995 and 2000, less than fifteen mutual funds had investments in private firms, compared to 96 in 2014. Interestingly, after strong growth for a number of years, there has been a slight decrease in 2015 and 2016. As shown by the bars, these trends are not a function of

changes in the aggregate number of funds.

Panels B and C show that the number of private VC-backed companies held by mutual funds and the dollar value of funds' investments in these companies have also increased. The number of companies with mutual fund investment increased over the 1995 – 2015 period from 4 to 99, and the aggregate valuation of these investments increased from $16 million to over $8 billion. Perhaps surprisingly, 36 companies received mutual fund financing in 2000, which is only moderately lower than the peak of 46 companies in 2015. However, the average size of these financings was substantially smaller in 2000 (not tabulated), which contributes to the stronger upward trend in dollars invested shown in Panel C. Consistent with evidence in Panel A, there has been a slowdown in all these metrics in 2016.

The number of mutual fund investments in private companies is positively correlated with other cycles in the financing of private firms. The number of companies receiving mutual fund financing for the first time (shown in Panel B of Figure 1) co-moves with the number of IPOs, with a correlation of 0.47 (not tabulated).[10] Interestingly, the number of companies receiving mutual fund financing for the first time appears to be somewhat higher prior to market crashes, e.g., at the height of the Internet Bubble in 1999 and 2000 and prior to the Financial Crisis in 2008, but the amount of capital invested is substantially higher in the immediate wake of these events, e.g., in 2001 and 2009 – 2011. We conjecture that this latter effect reflects the infeasibility of going public in these years combined with a demand for capital to survive.

Panel A of Figure 2 shows that the capital provided by mutual funds represents an increasing percentage of total financing obtained through these funding rounds. In the 1995 – 2005 period, mutual funds provided an average 22.1% (median 5.6%) of capital in funding rounds. This increased to an average of 27.0% over the 2006 – 2010 period and to 38.0% over the 2011 – 2016 period

[10] Appendix Table A1 provides further evidence on this issue, showing the correlation between mutual fund investments into private firms and both proceeds raised and initial returns of IPOs at the industry level.

(medians = 11.7% and 33.3%). Panel B shows that mutual funds tend to concentrate their investments in expansion and later stage companies, which is consistent with their presumably greater expertise in later stage companies.[11] Somewhat surprisingly, they have become increasingly likely to invest in earlier stage companies, with nearly 20% of capital invested going toward early stage companies in the 2011 – 2016 period.

Figure 3 highlights the extent to which the most successful venture-backed private companies have been increasingly likely to receive mutual fund financing. Specifically, the sample is restricted to those VC-backed firms that successfully went public, and for each year the bar graph depicts the number of such firms that received mutual fund financing prior to the IPO (bottom, dark-shaded portion of each bar) versus those that did not (top, lightly-shaded portion). The overlaid line shows VC-backed IPO firms that received mutual financing prior to the IPO (bottom portion of each bar) as a percent of all VC-backed IPO firms (total bar). This percent ranges between 0 – 5% in the years prior to 2010, and has increased substantially in recent years, to 24% in 2015 and 39% in 2016.

While these figures are merely descriptive, they are consistent with several underlying dynamics. First, the development of the internet has substantially decreased the costs of information collection. Second, the fall in the number of companies going public since 2000 (see, e.g., Gao, Ritter, and Zhu, 2013) means that mutual funds are less able to gain exposure to one sector of the market, i.e., to small, high growth firms. For reasons related to diversification and/or to fund mission, funds looking to gain such exposure may turn toward private firms. Third, incentives to earn higher returns in a low-interest rate environment may have pushed mutual funds to mimic successful strategies of hedge funds and other institutional investors to embrace alternative investments

[11] One factor potentially driving mutual funds to increasingly invest in early stages is a search for more risk, for investments that are less correlated with public firms. This argument is highlighted in 'Desperate For Returns, Mutual Funds Add Risk By Investing In Private Startups': http://www.forbes.com/sites/thomaslandstreet/2015/12/08/desperate-for-returns-mutual-funds-add-risk-by-investing-in-private-startups/#429f6586d5a8

including private equity.[12] Finally, to the extent that the costs of being a public firm have increased, companies demand more capital to enable them to stay private longer.

4. Mutual funds' choice of companies in which to invest

4.1 In which private companies do mutual fund invest?

Private firms are characterized by high information asymmetry, and the set of private firms in which funds can potentially invest is vast. We predict that mutual funds will focus on companies for which information collection costs are lower, for example due to stronger, more verifiable signals or to the presence of more credible intermediaries. Table 3 shows OLS regressions, where each VC-backed private company represents one observation and the dependent variable equals one if that company received mutual fund financing prior to either the end of the sample period or to exit. Column 1 includes the full sample of 28,516 private VC-backed companies. Columns 2 – 4 restrict the sample along various dimensions, to limit the sample of firms to those on which mutual funds might more likely focus their attention: companies with at least two rounds of venture capital financing (Col 2), companies also be funded by at least two venture capitalists prior to mutual fund investment (Col 3), and companies additionally raise an above-median amount of capital in the first financing round, where medians are defined on a yearly basis (Col 4). All specifications include stage (early, expansion, or later stage), state (of firm headquarters), industry, and first VC round year fixed effects. Variables that vary over time are defined as in Table 2.

The results are striking in the extent to which observables at the time of the first VC round relate to the incidence of mutual fund financing, in spite of the fact that mutual funds generally don't finance companies until they have achieved a later stage of development. Both amount of money raised and quality of VCs in the first round are significantly positively related to the probability of receiving mutual fund financing. A one standard deviation increase in the number of exits by the

[12] http://www.barrons.com/articles/alternative-investments-surfing-the-market-1445664165

funding VC(s) is associated with a 27% increase in the probability of mutual fund financing.[13] In addition to representing another proxy for firm quality (as higher quality companies are more likely to be backed by higher quality VCs), this likely also captures certification effects. A mutual fund looking to invest in private firms relies on high quality intermediaries, i.e., VCs, for credible information. In addition, the company's stage of development, as proxied by both the total number of VCs providing funding and the number of patents for which the company has applied are also highly significant. Finally, companies that receive a second round of financing within a shorter period of time are also more likely to receive mutual fund financing.

Results are robust to limiting the regression sample to companies that received their first funding round over the 2005 – 2016 period (shown in Appendix Table A2). This suggests that mutual funds continue to invest in these same types of companies in more recent years.

4.2 In which IPO companies did mutual funds invest prior to IPO?

Figure 4 provides a different perspective on the companies in which mutual funds choose to invest, by focusing on a set of companies that were ex post successful, i.e., that went public via an IPO. We examine financial characteristics in the years prior to and following the IPO. In each panel, year 0 is the fiscal year that includes the IPO. Panels A through D examine total assets, net sales, expenditures (= CapEx + R&D + SG&A), and gross margin, respectively. Together these panels suggest that the companies in which mutual funds have invested are characterized by higher growth.

Looking first at Panel A, companies with mutual fund investment are 76% larger in terms of assets two years prior to the IPO ($33 versus $24 million), but the difference increases to a differential of 124% by two years post-IPO. Similar conclusions emerge from Panel B, which focuses on sales. Panel C suggests that much of this higher growth is coming from higher

[13] The standard deviation of ln(# Exits by VC) is 1.26. Based on the column 1 estimates, the probability of receiving mutual fund investment increases by 0.002*1.26 = 0.0025, or 0.25%. When compared to the unconditional mean 0.94% of receiving mutual fund financing, this represents a 27% (0.25 / 0.94 = 0.27) increase in probability.

expenditures. Panel D indicates that this higher growth trajectory of the companies in which mutual funds invest is also manifested in lower profits for an extended period of time. The combination of both higher sales and higher expenditures of the mutual-fund backed companies, but lower gross margin is consistent with these companies having insufficient internal cash flows to fund their growth and thus demanding more external capital. The statistical significance of these relations is confirmed in a series of regressions, shown in Appendix Table A3.

These types of companies may find it difficult to raise sufficient financing from venture capital, if they want to delay going public. The reasons are twofold. First, individual venture capital funds avoid investing too much money in any one company, for reasons related to diversification. In addition to VC partners seeking to lower risk, limited partners also include restrictive covenants on the amount of capital that funds can invest within any one company (see, e.g., Gompers and Lerner (1996), Kaplan (1999), and Metrick and Yasuda (2010)). Second, there are frictions associated with having too many venture capitalists funding a company, for reasons related to contracting and control. Mutual funds provide a solution to this problem. In this way, mutual fund financing provides benefits similar to those discussed by Hochberg et al. (2016) for venture debt.

5. Do companies obtain 'incremental capital' from mutual funds?

To shed light on how mutual fund investments influence the underlying companies, we examine the ways in which they mitigate key constraints for private firms. Specifically, we examine the extent to which they provide new capital and/or additional liquidity to the companies.

5.1 Primary shares or secondary shares?

We first investigate whether mutual fund investments predominantly represent primary shares or secondary shares. The high growth trajectory of these companies (Figure 4) makes primary share investments particularly beneficial. However, purchases of secondary shares are also valuable, as the increased liquidity enables existing shareholders to sell at least a portion of their holdings and

thereby lessens pressure to go public before the company is ready.[14]

Because mutual funds do not report whether their investments were primary or secondary shares, we employ two alternative procedures to identify share type. First, we tabulate the portion of mutual funds' investments that represent preferred shares, versus everything else (which includes common stock, warrants, etc.). Kaplan and Stromberg (2003) and conversations with VCs suggest that primary share investments are more likely to be in the form of preferred stock. For each mutual fund investment into each firm, we calculate $\frac{\$\,Preferred\ Shares\ Invested}{\$\,Total\ Invested}$ as a proxy for percent primary investment. As shown in Panel A of Figure 5, this categorization indicates that in 87% of cases the companies issue almost entirely primary shares, compared to only 2% of cases representing entirely secondary shares. Conclusions are similar if these measures are calculated at the investment level (not tabulated).

Our second approach to assessing the extent of primary share investment is to match by date each mutual fund investment with reported rounds in Thomson Reuters. We find that 71.1% of the 1,573 mutual fund investments in our sample (where each of these 1,573 observations represents an investment by one fund in one company at one date) are within 30 days of a reported Thomson Reuters round. Panel B of Figure 5 shows the time distribution of these 71% of cases: the concentration in the days preceding the round closing date is consistent with funds investing in the weeks leading up to the final round close date. While the remaining 29% of cases potentially represent a combination of primary shares (e.g., if the mutual fund purchased the shares more than 30 days prior to the round closing date or if the round date in Thomson Reuters is reported with error) and secondary shares, Google searches on a random sample indicate that primary shares are issued in most (84%) cases. In aggregate, these alternative methods suggest that 90 – 95% of mutual fund

[14] For example, when Intel invested $740 million into Cloudera in 2013, a portion of this investment represented secondary share purchases and thus provided no new capital to the company. https://techcrunch.com/2014/04/01/much-of-intels-740m-cloudera-investment-likely-went-to-existing-shareholders/

investments represent predominantly primary shares.[15]

5.2 Do mutual fund investments increase total capital raised?

The effect of this new capital on the underlying companies depends critically on the extent to which it is incremental to investments that VCs would have otherwise made. If each $1 million of capital from mutual funds is offset by $1 million less from venture capitalists, then the capital constraints of the underlying companies are largely unchanged. Institutional factors suggest mutual fund capital represents more than just a substitution away from VC funding. First, the viable scale that companies must achieve before going public has increased over the past 15 years (see, e.g., Gao et al., 2013), suggesting that private companies' demands for capital have increased. Second, as discussed previously, existing VCs are both limited in the total amount of capital they can provide to a company (for diversification reasons) and hesitant to bring on too many additional VCs (for reasons related to control rights). We conjecture that mutual funds represent a solution to these constraints, and therefore represent a source of incremental capital.

We begin with descriptive evidence. Figure 6 restricts the sample to the 1,151 funding rounds across the 195 unique companies that obtain mutual fund financing in at least one round, and compares round size across the rounds with versus without mutual fund participation. We match the mutual fund investments to venture financing rounds using Thomson Reuters in Panel A (as this source provides the more comprehensive sample of venture financing rounds), and to CrunchBase in Panel B (as this source provides detail on the series, e.g., Series A, Series B, etc.). In both cases, we match the rounds if the mutual fund acquisition date is within 30 days of the venture round date. Under each definition approximately 21% of company rounds include mutual fund participation.

Results are consistent across both panels. Among companies that receive mutual fund

[15] We have also performed a similar match using Crunchbase data. While Crunchbase includes a smaller number of firms, it has the advantage of including series number (Series A, Series B, etc) which enables a more precise match with the mutual fund investments. Conclusions are similar under this approach.

financing in at least one round, the rounds with mutual fund participation are substantially larger than those without. Looking at the kernel density plot in Panel A, rounds with mutual fund participation lie solidly to the right, i.e., are consistently larger, than those without. Looking at the series-level data in Panel B, this conclusion holds across every series. For example, among Series B financings, the median size of rounds with versus without mutual fund participation is $58 million versus $15 million.[16] Importantly, because the sample is restricted to companies that receive mutual fund financing at some point, this difference does not reflect a company-type effect.

Table 4 provides further evidence on the extent to which mutual fund investments provide incremental capital to companies, within a regression framework that enables us to control both for other determinants of round size and for the endogeneity of mutual fund participation. Looking first at panel A, the dependent variable is the natural log of the round amount, and the independent variable of interest is a dummy equal to one if the round included participation by one or more mutual funds. Controls include variables previously used in Table 3 such as VC quality and firm patents, variables to capture the stage of development at the time of the round, and one measure of investor participation following Ewens, Rhodes-Kropf, and Strevulaev's (2016) finding that rounds that include no new investors tend to be smaller ('inside round'). Fixed effects at the stage, state, industry, financing round year, and lead VC level are also included. Lead VC represents an additional proxy for company quality and is defined as the VC that participated in the first round and, conditional on such participation, made the largest total investment in the company across all funding rounds (see Nahata, 2008). Columns 1 and 2 show OLS regressions, while Columns 3 and 4 show the first and second stages, respectively, of a 2SLS specification to control for endogeneity.

Across all specifications, conclusions are similar to those from Figure 6: mutual funds

[16]The larger round amounts of rounds with mutual fund financings is NOT driven by the fact that such rounds are predominantly the last round a company raises. In fact, only 55% of rounds with mutual fund participation represent the last round a company raises. Because relatively few companies have series F, G, and beyond, we merge them into a single category.

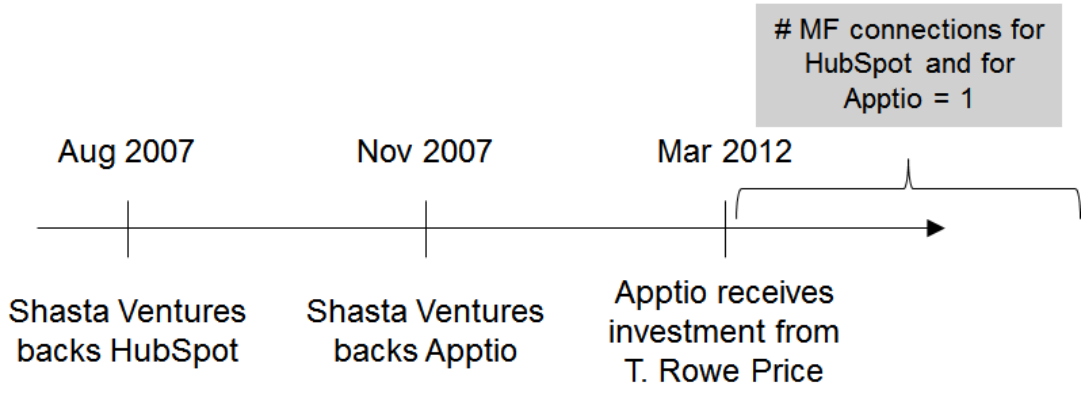
appear to be providing incremental capital to companies, rather than merely substituting for VC funding. Across the full sample of 71,341 VC rounds, of which 233 include mutual fund investment, Column 1 indicates that rounds with mutual fund participation are 105% larger, significant at the 1% level. To mitigate the endogeneity associated with mutual funds focusing on more successful companies with greater demands for capital and thus larger round sizes, columns 2 – 4 restrict the sample to the 1,147 funding rounds across the subset of VC-backed companies that receive mutual fund investments in at least one round (and that we can match to financing rounds listed in Thomson Reuters).[17] Similar to Column 1, the OLS regression in Column 2 shows that rounds with mutual fund participation are significantly larger. Consistent with a lessening of endogeneity-related biases, the effect of mutual fund participation on round size is a smaller 71% (compared to 105% in col 1).

To control for the possibility that the rounds in which mutual funds participate are larger for reasons other than the mutual funds' participation per se, Columns 3 and 4 utilize a 2SLS approach. We note that the most likely source of endogeneity in this context is correlated omitted variables, i.e., if the investment by the mutual fund is correlated with other factors that we do not observe and which cause round size to be larger. Because the sample is defined such that every firm has mutual fund investment at some point, time-invariant correlated omitted variables should not be a concern. We require an instrument that is correlated with mutual funds' decision of whether to participate in a round (the relevance condition) but not correlated with factors that affect the round amount (the exclusion condition). Based on both a broad academic literature on the value of connections and on conversations with mutual fund managers and venture capitalists, we argue that the existence of connections between mutual funds and the VC(s) that have provided funding to the firm as of a particular point in time satisfy these conditions.

To quantify each VC's connections with mutual funds, we do the following. For each

[17] The sample size in Table 4 is slightly smaller than that in Figure 6 due to the use of lead VC fixed effects. Cases in which a VC only served as lead in a single round drop out of the sample.

company-round date (the observation level in regressions), we count the number of VCs funding the company that have syndicated with mutual funds within the prior five years. Thus, this measure varies as a function of both new VC(s) providing funding to the firm and existing VCs developing new connections with mutual funds through other companies in their portfolios. The schematic below provides an example illustration. Shasta Ventures funded HubSpot in August 2007 and then Apptio in November 2007. Subsequently, in March 2012 Apptio received an investment from T. Rowe Price. Thus, the VC that funded both Apptio and HubSpot, i.e., Shasta Ventures, has a connection with a mutual fund, and all companies backed by Shasta are subsequently considered to have a mutual fund connection.



Finally, we note that stage, state, industry, lead VC and VC round year fixed effects capture many of the time-series trends (mutual fund investments have increased over time) and cross-sectional patterns (mutual fund investments are more common among certain firm types) documented earlier.[18]

The relevance condition is satisfied by the fact that a prior relationship with a VC lowers mutual funds' research costs: a mutual fund who has previously co-funded with a VC has gained

[18] Because the regression is defined at the company-round level, the instrument must be defined as whether the company has a connection with any mutual fund. Thus, it is possible that a subsequent mutual fund financing be from either the same fund (e.g., with T Rowe Price in the example shown in the schematic) or from a different fund. Information flow is likely along both cases, as any VC that has worked with a mutual fund in the past will have expertise that other VCs would not. However, the information flow is more direct if it is the same fund. As detailed in Appendix Figure A1, in the vast majority of cases, when a company has a mutual fund connection (through a VC), the mutual fund that ultimately provides the financing represents the fund with the direct connection.

various expertise that decreases the costs of subsequent similar transactions, a prior relationship facilitates efficient communication between the VC and the mutual fund manager, and reputation effects combined with trust built through prior interactions should make such information credible. In terms of the exclusion condition, we can think of no reason that a relationship between a company's VC and a mutual fund manager would independently be related to changes in a company's characteristics over time in ways that would cause certain rounds to be larger than others, particularly after controlling for the time and stage fixed effects as described above.

Column 3 of Table 4 shows the first stage regression, where the dependent variable equals one if the mutual fund participated, zero otherwise. Our instrument, the number of VCs with mutual fund connections, is positive and significant as predicted in explaining the likelihood of receiving a mutual fund investment. If a company has one more VC with a mutual fund connection, the probability of its financing round having a mutual fund participation increases by 4.7 percentage points (equivalent to 23.5% increase).[19] Conclusions from the second-stage regression are consistent with those from the OLS specifications. Round amounts that include mutual fund participation are significantly higher.

A comparison of the OLS versus 2SLS estimates reveals that the latter are greater. The presence of a local average treatment effect (LATE) is likely to be a contributing factor (Angrist and Pischke (2009)). To provide intuition, consider the likely scenario where company-rounds are determined by a combination of a company's stage of development and the company's probability of success, both of which are only imperfectly captured by the control variables. There will be some company-rounds that will clearly be small, due to early point in the life cycle and/or lower probability of success, i.e., investors in aggregate will only be willing to provide a relatively small amount of capital. Analogously, other company-rounds that will be clearly large

[19] The unconditional probability of having mutual fund in financing round in the sample is 20% (230 / 1147 = 0.2). Therefore, the change in probability is 23.5% (4.7% / 20% = 0.235)

for the precise opposite reasons. Importantly, our instrument is likely to isolate the marginal cases, i.e., cases in which the amount of money the company can raise is sensitive to its ability to overcome information asymmetries and thereby credibly convey the company's prospects. Because the connections between mutual funds and VCs capture exactly this decrease in information asymmetry, the effects on round amounts will arguably be greatest in exactly these cases. In sum, the subset of cases that are identified through the instrument represent cases where the magnitude of the effect on round amounts is likely to be greatest, and this LATE causes the 2SLS estimates to be greater than the OLS estimates.

Panel B of Table 4 presents an analogous set of regressions, with the exception that we focus on the effects of the dollar value of mutual fund financing, rather than just an indicator variable as in Panel A. Conclusions are similar using this dollar amount. Greater dollar investments by mutual funds cause total round amounts to be significantly higher.[20]

6. Relation between mutual funds' investments and companies' exit decisions

6.1 Time to exiting private status, and form of exit

In aggregate, findings in previous sections suggest that mutual fund investments will be strongly related to company outcomes. For example, funds' focus on higher quality companies suggests that these investments will be negatively related to company failure and positively related to success (selection effect). In addition, we also conjecture that the incremental capital provided by mutual funds will have a causal effect on company outcomes (treatment effect).

Before proceeding to our main empirical tests of these ideas, we strive to discern what defines 'success' for these companies. As discussed previously, we conjecture that mutual funds'

[20] An alternative way to examine whether mutual fund financing provides incremental capital is to regress the amount of funding provided by VCs in the company-round on the amount of money provided by mutual funds. Consistent with mutual fund capital *not* substituting for VC capital, we find no evidence of a negative relation. In addition, we have also estimated regressions including firm fixed effects, and results are qualitatively similar.

liquidity concerns as well as their predominant focus on publicly traded firms incentivizes them to focus on companies that have an objective of exiting private status, i.e., for whom success means going public via IPO. This contrasts with the incentives of other investors such as hedge funds and corporations, who face less binding constraints and are thus more willing to fund private companies who seek to stay private for more prolonged periods of time (see, e.g., Ewens and Farre-Mensa (2017)).

Figure 7 provides strong support for the conjecture that mutual funds are focusing on companies that seek to exit via IPO rather than stay private more indefinitely. We compare companies that are still private as of the end of 2016 but which are arguably at a sufficient level of development to go public.[21] For each company that meets these criteria and that has received mutual fund investment, we match to a company without mutual fund investment based on Wikipedia pageview count, defined as the number of pageviews as of the first mutual fund financing date for mutual fund-backed companies and as of the last financing round date for all other companies.[22] We then search the company's Wikipedia webpage, the company's Crunchbase webpage, Google and the Wall Street Journal for any instance in which a company insider, defined as the CEO, other company executive, or related venture capitalist clearly mentions an IPO plan over the 2013 – 2016 period. Panel A of Figure 7 shows that a company insider discusses an IPO plan in 50% of companies with mutual fund financing, compared to in less than 10% of other companies. Inferences are similar if we restrict to instances in which the CEO mentions an IPO plan, as shown in Panel B. In sum, companies with mutual fund financings are more (rather than less) likely to be planning their exit strategy.

[21] Specifically, we restrict our sample to companies that have received a financing round within the past four years, have received three or more financing rounds from four or more different VCs, and for whom the average first round VC has funded nine companies over the past three years and has had at least 2.5 successful exits (where these cutoffs are based on the 25th percentile of these distributions, to exclude companies backed by low quality VCs).
[22] For companies without Wikipedia pageview counts, we randomly select a non-mutual fund backed company that similarly does not have Wikipedia pageviews.

We next seek to determine the effects of mutual fund financing on the timing and form of these exits. First, the greater availability of capital mitigates one constraint that can otherwise push firms to go public before they are well positioned to manage the requirements of being a publicly traded firm, e.g., the added disclosures, regulatory requirements, and pressure from institutional investors. We thus predict that mutual fund financing should enable companies to stay private longer. Second, the greater availability of capital enables companies to achieve a greater level of development while still private. This generates the related prediction that mutual fund financing increases the probability that the company will achieve a sufficient scale to exit private status via an IPO, rather than via acquisition. While IPOs generally offer founders and other pre-IPO investors the highest rates of return, this is only a viable exit strategy for the largest and most successful companies. Gao et al. (2013) show that the number of small IPOs has been particularly low since 2000, with smaller companies being more likely to exit via acquisition.

Looking first at Table 5, we begin by examining the relation between mutual fund investments and company outcomes in a series of cross-sectional OLS regressions, across the full sample of companies that received their first VC financing round during the 1990 – 2016 period. We focus on the extreme outcomes of IPO or failure, where IPO represents the most successful outcome and failure is defined as not having exited or receiving a funding round for at least four years prior to the end of the sample period. We consider two measures of mutual fund investment: a dummy indicating whether a mutual fund invested in the company and the log(1+amount raised from mutual funds). Consistent with predictions, Columns 1 and 2 show that companies with mutual fund financing are significantly less likely to fail. Both the incidence of mutual fund financing and the dollar amount of mutual fund financing are significantly negatively related to failure. Columns 3 and 4 show that these companies are significantly more likely to go public via IPO. In addition to failure or exit via IPO, many companies exit private status via acquisition. In untabulated results, we find that firms with mutual fund financing are significantly less likely to exit via acquisition, a

finding that is consistent with acquisitions being much less profitable on average (see, e,g., Chaplinsky and Gupta-Mukherjee (2016)). As Columns 1 – 4 are OLS regressions, they potentially incorporate two effects: a selection effect under which mutual funds are less likely to invest in companies that subsequently fail, and a treatment effect under which the capital provided by mutual funds gives companies more flexibility to continue operations until they can successfully exit.[23] We examine these conjectures more directly below.

Columns 5 and 6 in Table 5 show that companies with mutual fund financing also tend to stay private significantly longer. This similarly includes both a selection effect and a treatment effect. Mutual funds may focus their investments within companies that are closer to exiting, for example due to the greater availability of information on such firms or to liquidity concerns, but the added capital may enable the companies to stay private longer than they otherwise would.

Figure 8 provides a graphical illustration of the time to exit patterns shown in Table 5. Panel A shows the kernel density plot of time to exit from the first financing round, for companies with versus without mutual fund financing. The density of companies with mutual fund financing lies solidly to the right, indicating that these companies tend to stay private longer. Panel B shows a more granular analysis, where we classify companies into one of four categories: companies with their first VC financing round over the 1990 – 2000 and 2001 – 2010 periods that exited via IPO, and companies over each of these periods that exited via acquisition. Across all four groups, the companies with mutual fund financing stayed private substantially longer.

Table 6 examines these the extent to which these relations are causal. Panel A focuses on the extent to which mutual fund financing enables companies to stay private longer, using the full sample of venture-backed companies that have exited private status (by going public or by being acquired). For these 2SLS regressions, we use the number of VCs with a mutual fund interaction in the past five

[23] The concentration of mutual fund investments in the years following the Crash of the Internet Bubble and following the Financial Crisis provide some support for a treatment effect.

years as an instrument, as defined previously. Here, the exclusion criterion requires that mutual funds' relationships with VCs not directly affect time to exit.[24]

The dependent variable in Table 6 is the log of time to exit, measured as the number of years between the first VC round and either IPO or M&A. We employ two measures of mutual fund participation: a dummy equal to one if a mutual fund invested in the company at some point and the log of the amount of capital invested by mutual funds. Each regression includes control variables and fixed effects used in previous tables.

Results provide strong evidence that mutual fund financing enables companies to stay private longer. Results in column 2 indicate that mutual fund financing increases time to exit by 36%, which equates to 1.8 years relative to a mean time to exit of 4.93 years.[25] Column 4 indicates that a 10% increase in funding from a mutual fund leads to a 1.2% increase in time to exit. For a company that receives $10 million additional funding from mutual funds, this would equate to 3.1 additional months in private status.[26]

Our finding that the 2SLS coefficient (Table 6) is greater than the OLS coefficient (Table 5) is consistent with similar patterns in Table 4 and likely to be similarly driven by a local average treatment effect (LATE). The subset of companies whose total capital raised is sensitive to their ability to overcome information asymmetry with prospective investors, e.g., through a mutual fund connection, will also tend to be companies whose outcomes (such as time spent in private status) are most sensitive to this infusion of capital.[27]

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[24] While higher quality VCs are more likely to have relationships with mutual funds, such an effect would likely bias us *against* finding that mutual fund financing enables companies to stay private longer: Hochberg et al. (2007) and Nahata (2008) find that higher quality VCs exit their portfolio companies faster, and we find similar effects within our sample. Also, we include lead VC fixed effects, which accounts for any time-invariant aspects of VC quality.

[25] The economic significance of 36% is calculated as $e^{0.31} - 1 = 0.36$

[26] An additional $10 million reflects a 33% increase relative to the mean mutual fund investment of $30 million. Thus, the coefficient of 0.121 suggests that this will cause a (0.33) * (0.12) = 4% increase in time spent in private status. Relative to the mean of 6.5 years this represents an increase of 3.1 months.

[27] It is also possible that the difference is driven by a negative selection effect, which is included only in the OLS estimates. This would be the case if mutual funds disproportionately invested in company types that tended to stay private longer for reasons not captured by our control variables.

The finding that mutual fund financing enables companies to stay private longer suggests that this financing will also enable companies to achieve a sufficient level of development to exit via IPO, rather than being acquired as many smaller companies choose. In other words, it suggests that our prior finding (Table 5) of a positive relation between mutual fund financing and IPO incorporates both a selection effect, where mutual funds choose to invest in more successful companies that have a higher probability of going public via IPO, and a treatment effect, where the capital provided by mutual funds contributes positively to the development of these companies and thus increases the probability of going public via IPO (treatment). Panel B of Table 6 examines this prediction.

Consistent with predictions, Panel B of Table 6 indicates that mutual fund financing significantly increases the probability that a company goes public via an IPO. In contrast, we find that mutual fund financing has no causal effect on firm failure (columns 2 and 5 in panel B). This is consistent with mutual funds' lacking the control rights and arguably the expertise necessary to avert failure, e.g., replacing the CEO or drastically restructuring the firm (see, e,g., Chernenko et al, 2017). Rather, mutual funds concentrate their investments among firms with more proven business models, and in these cases the extra capital infusion increases the probability that the firm grows to a sufficient scale to go public via an IPO (rather than being acquired).

6.2 Valuation upon exiting private status

There are several ways in which mutual fund financing potentially influences the valuation of companies around the time of the IPO, a point at which information asymmetry is generally quite high. First, mutual fund financing may represent a positive signal to other investors at the time of the IPO, suggesting it would enable the company to go public at a higher offer price, relative to book value. Second, mutual fund financing may enable the company to grow to a more sustainable level before going public, suggesting a lower probability of future distress and higher future expected future cash flows, both of which would similarly contribute to a higher offer price. Third, mutual fund financing may cause the company to remain private through its highest growth period meaning

the expected growth rate of cash flows after going public will be lower, an effect which would contribute to a lower offer price relative to book value. In sum, the hypothesized relation is not clear.

Figure 9 provides descriptive evidence on the issue, plotting the kernel density of sales multiples based both on the offer price (Panel A) and the closing price on the first day of trading (Panel B). In both cases, the valuations of companies with mutual fund financing lie solidly to the right of those without, which would be consistent with the positive signaling and the lower probability of distress factors. However, these relations are descriptive and cannot speak to causality. Regressions that control for both other determinants of these valuation multiples and for endogeneity show no consistent significant relation (not tabulated). As a more direct test of the signaling effects, we have also examined the extent to which mutual fund financing enables firms to go public at a higher offer price and thereby to be less underpriced. However, as reported in Appendix Figure A2 and Table A4, we find no evidence to support this prediction.

7. Benefits to Mutual funds

7.1 Mutual Funds' returns to investing in private firms

Mutual funds' decisions to supply capital to private firms contrasts with their traditional focus on public firms. The stark differences between these firm types, for example the fact that private firms lack a publicly observable stock price that serves as an aggregate measure of market participants' overall valuation, raises questions about mutual fund managers' comparative advantage in investing in private firms. We conjecture that mutual funds' willingness to supply this form of capital stems from a search for returns that are higher than or less closely correlated with those on their public market investments.

Table 7 provides evidence on funds' average returns in this sector. Across the 149 unique mutual funds that invested in VC-backed private firms over the sample period, Panel A tabulates the percent of each fund's investments that exited via either IPO or acquisition and Panel B tabulates the

returns on the subset of fund-investments with exited via IPO. Across the entire sample period, the average (median) mutual fund exited 41.2% (33.3%) of its investments via IPO and 10.9% (0%) via acquisition.

Looking at Panel B, Row 1 shows that the average (median) fund investment earned a raw return of 438% (126%) across the subset investments that exited via IPO, where return equals $\frac{First\ Day\ Closing\ Price - Fund\ Acquisition\ Cost}{Fund\ Acquisition\ Cost}$. On a monthly basis, this equates to an average (median) return of 18.3% (4.1%). As shown in the lower portion of Panel B, these returns are substantially higher than the average monthly returns of 1% or less on the equal-weighted, value-weighted, and S&P 500 indices measured over the same periods. Moreover, the last column shows that in addition to providing substantial returns over this time period, the private firm investments had very low correlations with the public market indices. While statistically significant, the correlations are all below 0.15. In sum, over this period, these investments provided mutual funds with substantial returns (even after accounting for the fact that only approximately half successfully exited) and substantial diversification benefits.

7.2 Mutual funds' IPO allocations

An additional potential advantage of investing in firms prior to the IPO is that it may enable funds to obtain greater allocations in the company's IPO. Because IPOs are underpriced by an average of 15%, IPO allocations are coveted by investors. Several papers conclude that investors engage in various quid pro quo activities with investment banks to obtain higher IPO allocations, (see, e.g., Reuter (2006), Ritter and Zhang (2007), Nimalendran, Ritter, Zhang (2007), and Goldstein, Irvine, and Puckett (2011)). While the lack of publicly-available allocation data on all sample firms presents an obvious challenge, Table 8 examines this in two ways. First, in Panel A we compare post-IPO fund holdings at the first available post-IPO mutual fund reporting date; Reuter (2006), Ritter and Zhang (2007), and Chemmanur, Hu and Huang (2010) have used this as a proxy for IPO allocations. Second, in Panel B we take advantage of an institutional reporting requirement to obtain

actual allocations across a subset of cases.

Looking first at Panel A of Table 8, fund families that invested in the firm prior to the IPO hold significantly more shares after the IPO. We focus on the fund families that invested in at least one firm prior to its IPO, and we compare post-IPO holdings across those firms in which each family did versus did not invest pre-IPO.[28] Results show that the median (99th percentile) mutual fund family that invested in the firm pre-IPO holds 2.84% (22.46%) of the firm post-IPO, compared to substantially lower ownership 0.28% (10.14%) among fund families that did not invest pre-IPO. [29] We tabulate these statistics at the family level rather than the fund level, as underwriters typically allocate shares to families rather than to individual funds (see, e.g., Shen (2017)). However, conclusions are similar at the fund level (not tabulated).

Panel B provides more direct evidence on allocations. Of the 14 mutual fund families in our sample during 2010-2016, 3 are affiliated with an investment bank: Morgan Stanley, Allianz (affiliated with Morgan Stanley and JP Morgan), and Sun America/Seasons (affiliated with Goldman Sachs and JP Morgan). Under SEC rule 10F-(3), these funds must disclose the allocations that they receive in any IPO in which the affiliated investment bank was a member of the IPO syndicate (Shen, 2017). These disclosures are made on form NSAR, filed with the SEC. Appendix I, Section F provides an example. Exploiting this institutional detail, we collect the actual IPO allocation data for these three fund families. We start with all VC-backed IPOs during the period 2010-2016 where one of these banks was one of the IPO syndicate members. Across this set of company – fund family pairs, there are a total of 14 pairs in which the fund family invested prior to the IPO and 247 where

[28] We limit the sample to fund family – firm pairs in which the date of the firm's IPO occurred after the family began investing in private firms.

[29] Across IPOs*mutual fund pairs, where mutual funds are limited to those that hold at least one newly public firm at the first reporting date during our sample period, results in Table 8 indicate that only about 5% of fund-company pairs have positive holdings in the first 3 – 6 months after the IPO. This statistic is actually much lower (0.56%) if we calculate the percent across all mutual funds (in the Thomson Mutual Fund database).

they did not.[30] We report statistics related to IPO allocations for these two samples and also for a matched sample. For each of these 14 cases, we use propensity score matching to select two controls that are similar on other dimensions but for which these banks did not invest prior to the IPO. Specifically, for each IPO*fund family pair we estimate a probit model across the set of IPOs in which its affiliated investment bank served as syndicate member. The dependent variable equals one if the fund family invested prior to the IPO and zero otherwise, and independent variables include variables from Table 3 (with the exception of fixed effects because of the small sample and the nonlinearity).

Looking at Panel B, mutual fund families are substantially more likely to receive IPO allocations when its affiliated mutual funds invested in the firm prior to the IPO. Across the 14 fund family – IPO firm pairs in which the family invested pre-IPO, the fund family receives IPO allocations in 64% of cases, compared to only 17% of cases across the entire set of 247 fund family – IPO pairs in which the family did not invest pre-IPO and 21% in the matched sample. Conditional on receiving an allocation, the percent of IPO shares allocated to these fund families is greater when one or more funds invested prior to the IPO. The mean (median) percent allocated is 4.7% (4.1%) in cases where affiliated mutual funds invested pre-IPO, compared to only 2.4% (3.0%) in the matched sample where there is no such investment. Differences are even greater in dollar terms, with mean dollar proceeds of $46.3 mil in cases where affiliated mutual funds invested pre-IPO, compared to $6.5 mil in other cases (not tabulated). In sum, both the small sample of IPO allocation data and the larger sample evidence on post-IPO fund holdings are consistent with the conjecture that mutual funds benefit from pre-IPO investment by receiving more IPO allocations.

7.3 Strategic valuation of pre-IPO investments

Finally, there has been some suggestion that funds' investments in private firms offer

[30] We thank Ke Shen for both providing institutional detail related to these allocations and for providing data for one bank-year whose filings were not machine readable.

another, more strategic, benefit. Specifically, due to the high information asymmetry of these firms and the lack of an observable market price, valuations are necessarily subjective. This raises the possibility that fund managers' incentives, for example as driven by compensation contracts or fund-flow patterns, may influence valuations. In fact, the popular press has drawn attention to the disagreement among funds regarding these valuations. For example, a 2015 WSJ article highlights the varying valuations of Uber, with Blackrock valuing it at $40.03 per share, Hartford Financial Services at $35.67, and Fidelity Investments at $33.32.[31] In potential contrast to such disagreement, mutual fund managers state that valuations are based on various criteria, many of which are largely observable. For example, each funding round causes a valuation, and this valuation is observable to all investors. Moreover, mutual fund investors generally also have Board observation rights and access to all internal documents associated with such Board meetings. Thus, any valuation-relevant material contained therein would be available to all these investors.

Panel C of Table 8 examines this issue by calculating the dispersion in valuation across the 137 private firms with more than one mutual fund investor, on a semi-annual basis (i.e., at each 6-month interval for which there are multiple mutual fund investors). For the median firm-period, dispersion in valuation, measured as $\frac{Highest\ Valuation - Lowest\ Valuation}{Lowest\ Valuation}$, equals zero. It equals 12% at the 75th percentile, 79% at the 90th percentile, and 138% at the 95th percentile. In sum, there is perhaps a surprisingly small amount of disagreement in most cases, a phenomenon that arguably reflects the extent to which verifiable information such as the valuation at the latest funding round dictates mutual fund valuations (see, e.g., Gornall and Strebulaev (2017)). However, there exists a large amount of disagreement within a relatively small subsample.

8. Conclusion

[31] 'Mutual Funds Flail at Valuing Hot Startups Like Uber', WSJ Oct 29, 2015.

Public listing status offers both advantages and disadvantages. Public firms potentially benefit from greater availability of capital, including for example a lower cost of capital (Brav, 2009; Gilje and Taillard, 2016). However, increased regulatory burdens and pressure from investors for short-term results can represent nontrivial costs for public firms (Asker, Farre-Mensa and Ljungqvist, 2015). Firms' decisions of when to go public represent a trade-off between the benefits and costs and public listing. It follows that if the benefits of going public fall for a private firm, then that firm should opt to stay private longer.

Results in this paper demonstrate that the availability of capital to private firms in the form of investments by mutual funds has increased dramatically over the past 15 years. This trend is consistent with changes in the financial landscape over the sample period, which influence both the demand for and the supply of such capital. From the companies' perspective, investments by mutual funds enable them to stay private longer, which enables them to achieve a higher level of development before becoming subjected to the regulatory demands, increased disclosure requirements, and pressure from institutional investors associated with being publicly traded. From the funds' perspectives, these investments have provided returns that are both higher than and virtually uncorrelated with returns on their public market investments.

Appendix I: Data Details

A. Additional details on obtaining mutual funds' holdings in private firms.

The process of matching mutual funds' holdings of restricted securities to our sample of private, venture-backed firms involves many complications, beyond those described within the main body of the paper. The purpose of this appendix is to provide additional detail, which may be helpful to future researchers.

In addition to verifying that a mutual fund has an investment in a private company, we also need to determine if the investment represents equity. While mutual funds' investments in private startups are classified as restricted securities, not all restricted securities are investments in private companies. For example, PIPEs (Private Investment in Public Equity), newly public firms' shares before the lockup expiration date, corporate bonds or notes with restricted conditions, investments in foreign countries, etc., are all classified under restricted securities. Using Python programming, we create a debt dummy = 1 if the filing contains wordings such as bond, note, term loan, tranche, etc. in the neighborhood of company name. In a similar way, we create an equity dummy = 1 if the filing contains wordings such as common, class A, class B, preferred, etc., in the neighborhood of company name. After creating these dummies, we manually check whether the investments are equity investments. Through this combination of Python and hand verification, we isolate equity investments.

In addition to matching fund holdings with firms on a semi-annual basis, we also wish to track individual funds over time. This is complicated by several issues: multiple funds report their holdings within a single filing (i.e., the reported filing is based on the CIK level rather than the fund level) and funds can change their names. To overcome this problem, we use the EDGAR-assigned series number provided to each fund, as this series number remains the same even if the fund changes names.[32] For example, CIK 0000024238 corresponds to Fidelity Contrafund. There are 4 funds that report filings under this CIK: Fidelity Advisor New Insights Fund (S000006036), Fidelity Contrafund (S000006037), Fidelity Series Opportunistic Insights Fund (S000039220), and Fidelity Advisor Series Opportunistic Insights Fund (S000039221). The characters in parenthesis represent series numbers. Because series numbers are provided beginning in 2006, we backfill series numbers for funds for the period 1995-2005. In cases where names are similar but not exact, we verify manually. This backfill is only possible if the same fund exists before and after 2005. If a fund only exists prior to 2005, we assign a pseudo series number.

[32] This is confirmed by David Marcinkus, the branch chief at the SEC as of August 2016.

B. An example: Fidelity Series Opportunistic Insights Fund, Sept 2015 Form N-Q.

Shown below is a screenshot from Fidelity Series Opportunistic Insights Fund's filing, for which the full filing can be found here:
https://www.sec.gov/Archives/edgar/data/24238/000137949115001530/filing706.htm

Legend

(a) Non-income producing

(b) Security or a portion of the security is on loan at period end.

(c) Investment is owned by an entity that is treated as a corporation for U.S. tax purposes and is wholly-owned by the Fund.

(d) Restricted securities - Investment in securities not registered under the Securities Act of 1933 (excluding 144A issues). At the end of the period, the value of restricted securities (excluding 144A issues) amounted to $175,667,666 or 3.1% of net assets.

(e) Coupon rates for floating and adjustable rate securities reflect the rates in effect at period end.

(f) Affiliated fund that is generally available only to investment companies and other accounts managed by Fidelity Investments. The rate quoted is the annualized seven-day yield of the fund at period end. A complete unaudited listing of the fund's holdings as of its most recent quarter end is available upon request. In addition, each Fidelity Central Fund's financial statements are available on the SEC's website or upon request.

(g) Investment made with cash collateral received from securities on loan.

Additional information on each restricted holding is as follows:

Security	Acquisition Date	Acquisition Cost
23andMe, Inc. Series E	6/18/15	$444,005
Airbnb, Inc. Series D	4/16/14	$1,259,254
Airbnb, Inc. Series E	6/29/15	$1,299,970
Altiostar Networks, Inc. Series D	1/7/15	$1,800,006
ASAC II LP	10/10/13	$17,881,600
Blu Homes, Inc. Series A, 5.00%	6/10/13 - 12/30/14	$6,232,491
Blue Apron, Inc. Series D	5/18/15	$3,200,002
Cloudera, Inc. Series F	2/5/14	$1,019,782
Cloudflare, Inc. Series D	11/5/14 - 6/24/15	$1,533,709
Delphix Corp. Series D	7/10/15	$1,843,875
Dropbox, Inc. Series C	1/30/14	$7,540,008
Legend Pictures LLC	10/15/14 - 6/10/15	$11,580,173
Magic Leap, Inc. Series B, 8.00%	10/17/14	$19,369,901
Nutanix, Inc. Series E	8/26/14	$2,303,662
Oportun Finance Corp. Series H	2/6/15	$6,756,617
Pinterest, Inc. Series E, 8.00%	10/23/13	$7,538,571
Pinterest, Inc. Series F, 8.00%	5/15/14	$7,211,381
Pinterest, Inc. Series G, 8.00%	2/27/15	$2,651,490
Pure Storage, Inc. Series E	8/22/13	$642,037
Space Exploration Technologies Corp. Series G	1/20/15	$2,483,832
SurveyMonkey	12/15/14	$7,534,725
Twilio, Inc. Series E	4/24/15	$1,833,453
Uber Technologies, Inc. Series D, 8.00%	6/6/14	$4,110,027
WeWork Companies, Inc. Class A	6/23/15	$1,184,189
WeWork Companies, Inc. Series E	6/23/15	$10,657,799

C. A potential alternative approach.

Our goal is to obtain mutual fund investments in private companies. Since SEC filings contain complete portfolio holdings and CRSP/Thomson-Reuters provides portfolio holdings for public companies, one might consider the following strategy: join public holdings to complete portfolio holdings and take the unmatched residuals. Unfortunately, a number of facts make this simple strategy complicated and inefficient.

First, while CRSP or Thomson-Reuters report data on fund level, mutual fund filings are based on the Central Index Key (CIK) level. For example, the CIK 319108 corresponds to BlackRock Series Fund, Inc., and there are eight individual funds under this CIK as of 2015.[33] To map these eight funds with CRSP or Thomson-Reuters, we need some type of fund identifier. However, there is no common identifier between fund in SEC filing and fund in CRSP/Thomson-Reuters. This implies that we would have to name-match fund names in CRSP or Thomson-Reuters with fund names in SEC filings. In addition, different funds use different names for the same company or security in their SEC filings. And of course, there is no company- or security- identifier in SEC filings. This implies that we would have to name-match every single security in Thomson to SEC filing.

D. Mutual Fund Families for which we collect data.

- Allianz
- Anchor
- Blackrock
- Fidelity
- Great-west
- Hartford
- John Hancock
- Morgan Stanley
- Seligman
- Smallcap World
- Sun America Asset Management
- T. Rowe Price
- Vanguard
- Wasatch

[33] The list of 8 funds are: Blackrock Balanced Capital Portfolio, Blackrock Large Cap Core Portfolio, Blackrock Total Return Portfolio, Blackrock Global Allocation Portfolio, Blackrock Capital Appreciation Portfolio, Blackrock High Yield Portfolio, Blackrock U.S. Government Bond Portfolio, and Blackrock Money Market Portfolio.

E. Patent data.

Following Denes (2017), we use Python scripts to download and convert all patent files into a machine-readable format. We extract patent number, assignee name, assignee city, assignee state, application date, and grant date. We cross-check our patent data with previous literature and confirm that the numbers are consistent. For example, Hall, Jaffe, and Trajtenberg (2001) document that there are approximately 70,000 applied patents in 1985 (Figure 1 in Hall et al., 2001). In our sample, the number is 78,643. Also, they document that there are approximately 90,000 granted patents in 1990 (Figure 2 in Hall et al., 2001), and we have 99,275 granted patents in this year.

Because there is no common identifier between the patent data and Thomson Reuters, we name-match the two databases. We first normalize patent assignee names by removing punctuations and legal suffixes and then implement the cosine similarity algorithm developed by Denes (2017) to name-match patent assignee names with VC-backed companies in Thomson Reuters. The algorithm gives us the matching quality with a scale of 0 to 1. We match patents with Thomson Reuters if one of the following criteria is met: 1) match quality is higher than 0.9, or 2) match quality is higher than 0.8 conditional on having the same city. The matching gives us 260,494 patents matched to 11,101 VC-backed companies in our Thomson Reuters sample.

F. IPO Allocation Disclosures.

Mutual funds that are affiliated with an investment bank are considered to be affiliated mutual funds under SEC rule 10F-(3). These funds are required to disclose the allocations that they receive in any IPO in which the affiliated investment bank was a member of the syndicate (Shen, 2017). Specifically, these disclosures are found in Form NSARs, under Item 770. Shown below is a screenshot from Morgan Stanley Institutional Fund Trust's filing, for which the full filing can be found here:
https://www.sec.gov/Archives/edgar/data/741375/000123683515000098/77O.Mid.Cap.Growth.txt

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<DOCUMENT>
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<FILENAME>77O.Mid.Cap.Growth.txt
<DESCRIPTION>MID CAP GROWTH RULE 10F-3
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Morgan Stanley Institutional Fund Trust - Mid
Cap Growth Portfolio
Item 77O- Transactions effected pursuant to
Rule 10f-3

Securities Purchased:  Lendingclub Corp.
Purchase/Trade Date:      12/11/2015
Offering Price of Shares: $15.000
Total Amount of Offering: $58,000,000
Amount Purchased by Fund: 1,081,454 shares
Percentage of Offering Purchased by Fund:
1.865
Percentage of Fund's Total Assets: 0.23
Brokers:  Morgan Stanley, Goldman Sachs &
Co., Credit Suisse, Citigroup, Allen & Company
LLC, Stifel, BMO Capital Markets, William
Blair, Wells Fargo Securities
Purchased from: Goldman Sachs
Firm Commitment Underwriting: YES
Issuer has over three years of continuous
operations*: YES
Percent of offering purchased by Fund and all
other accounts advised by the adviser is less
than 25%: YES
The underwriting commission, spread and profit
is reasonable and fair compared to the
underwritings of similar securities: YES
* Muni issuers must also have an investment
grade rating from at least one NRSRO; or if less
than three years of continuous operations, must
have one of the three highest rating categories
from at least one NRSRO.

</TEXT>
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Appendix II – Variable Descriptions

Variables	Definition
Characteristics of VC(s) providing funding	
VC Firm Age	VC firm's age in years since its founding year.
# Companies Funded	Number of portfolio companies in which the VC invested within the past five years. This is calculated at the time of the firm's first VC round, and is scaled by the average across all VCs (for the same time period).
# Rounds Invested	Number of financing rounds participated within past five years.
# Exits by VC	Number of unique portfolio companies that received financing from the VC and exited via either IPO or M&A, within the past five years. This is calculated at the time of the firm's first VC round, and is scaled by the average across all VCs (for the same time period).
Characteristics of firm	
I(MF investment)	Equals one if company received investment from mutual funds before exit.
Amount invested by MF ($ mil)	Total dollar amount invested in company by mutual funds before exit, or the end of the sample period.
Time b/w 1st and 2nd VC rounds	Duration between the first VC round and the second VC round. This variable is measured for companies with at least 2 VC financing rounds.
# Patents applied	# patents for which the firm applied as of a given date, conditional on patent being granted by the end of 2016. Descriptive statistics include values of this variable on a raw basis and on an industry-year adjusted basis. Industry and year-adjusted measures are used in all regressions.
Relation between firm and VC(s)	
Rounds Received	Total number of VC financing rounds a company received before exit, or the first mutual fund investment, or the end of the sample period, whichever comes first.
VC Syndicate Size	Total number of VCs that invested in a company before it receives a mutual fund investment, or as of the last financing round before the end of the sample period.
Amount raised ($ mil)	Total dollar amount a company raised in VC financing rounds before it receives a mutual fund investment, or as of the last financing round before the end of the sample period.
Exit Performance	
I(=1 if exited)	Equals one if company exits via either IPO or acquisition before 12/31/2016.
I(=1 if exited via IPO)	Equals one if company exits via IPO before 12/31/2016.
I(=1 if exited via M&A)	Equals one if company exits via M&A before 12/31/2016.
Time to Exit	(Exit date - first round VC financing date) / 365, where exit date is either IPO date or acquisition date.
Fixed effects (Dummy Variables)	

First VC Round Year	The year when a portfolio company received its first round VC financing.
Stage Level	Stage level has 3 categories: Early stage, Expansion stage, and Later stage.
State	Company location has 6 categories: CA, MA, NY, TX, PA, and Other.
Industry	Industry has 6 categories: Computer, Medical, Biotech, Communication, Other Electronics, and Non- High Tech.
Lead VC	The lead VC is defined as the VC that participated in the first round and, conditional on such participation, invested the greatest total amount in the company

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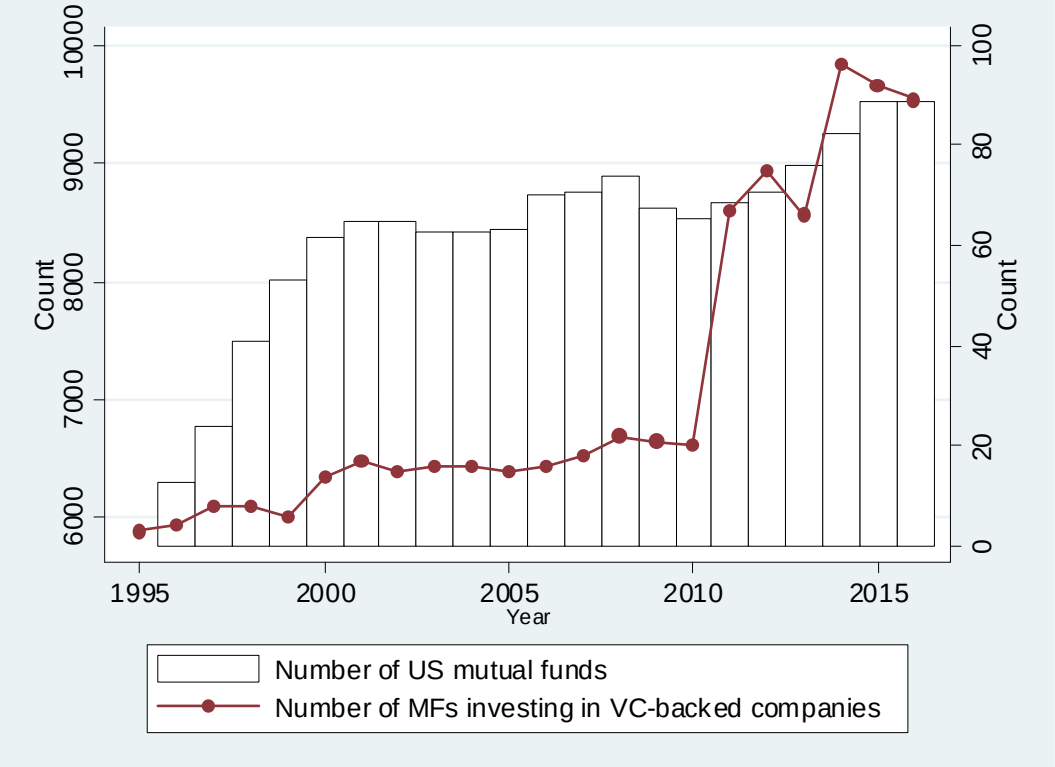
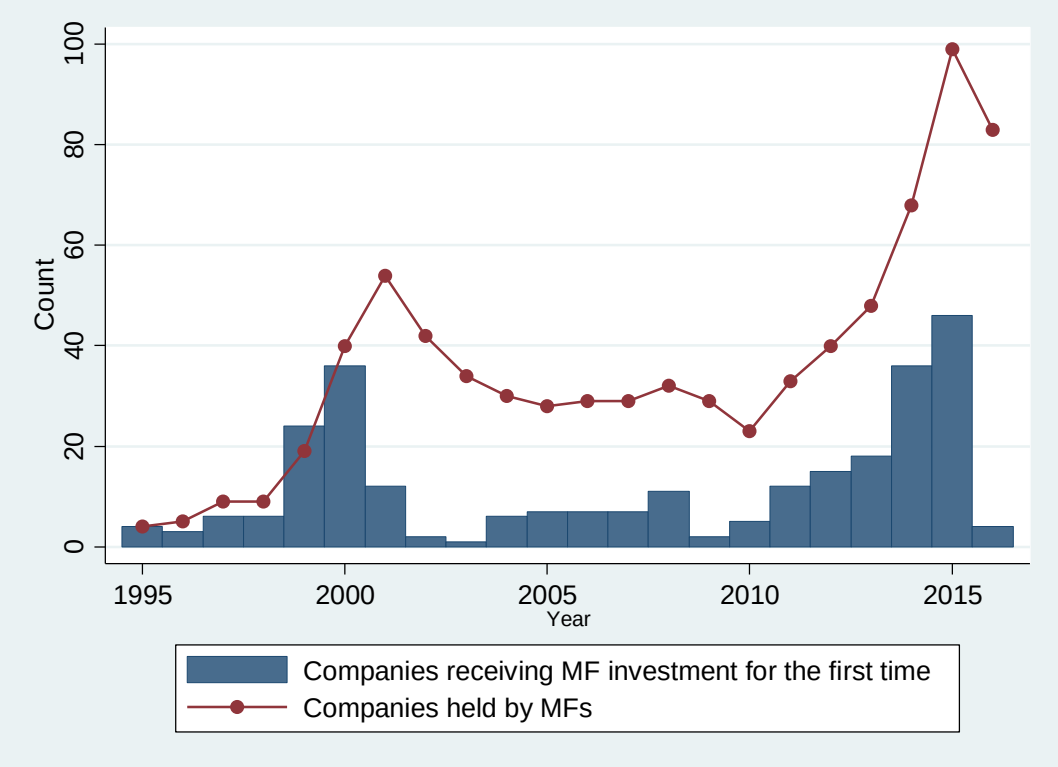
Figure 1: Mutual fund investments in private companies.

Panel A shows the total number of US mutual funds (from the Investment Company Fact Book) and the number of mutual funds that hold private VC-backed companies. Panel B shows the number of VC-backed companies receiving mutual fund investments for the first time as well as the total number of VC-backed companies held by mutual funds. Panel C shows the inflow of new investments in VC-backed companies by mutual funds and cumulative valuations of VC-backed companies. Mutual fund investments in VC-backed companies are based on mutual funds' restricted holdings extracted from EDGAR Form N-30Ds (1995-2005) and Form N-Qs (2006-2016). Valuations and new investments are based on the last available reporting date in each fund-year, and aggregated within each year.

Panel A: Number of mutual funds investing in private companies.



Panel B: Number of private companies receiving mutual fund investments.



Panel C: Amount invested in this space each year, and cumulative valuation of these investments.

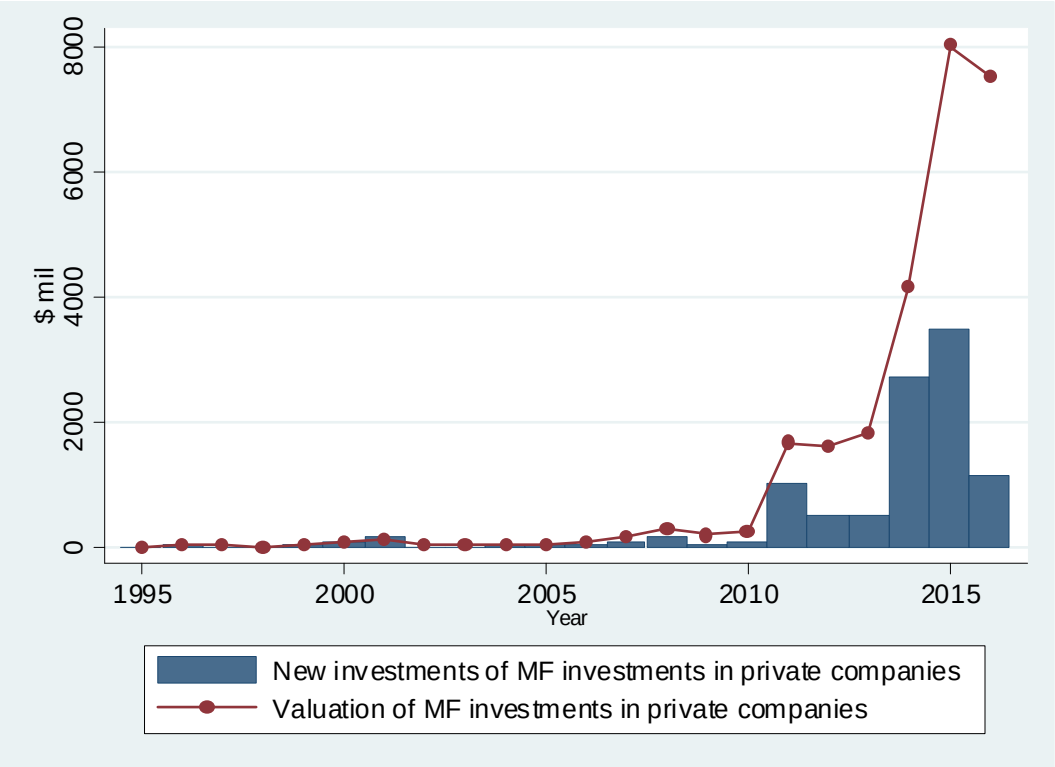
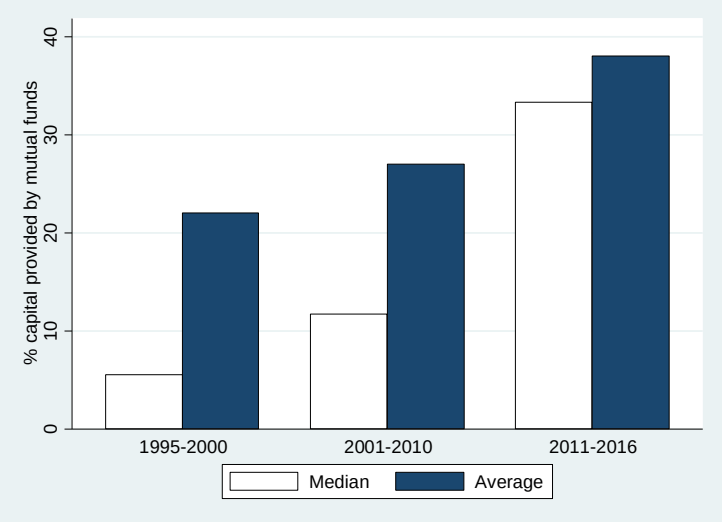


Figure 2: The magnitude of mutual fund investments in private companies

Panel A shows the percentage of capital provided by mutual funds within each financing round, conditional on financing rounds having at least one mutual fund as a participating investor. Among all 28,516 VC-backed companies that received first venture capital financing during 1990-2016 period, 270 companies receive investment from at least one mutual fund in private status. We match 1,737 financing round dates of those 270 companies with acquisition dates of 149 funds. We define a round as including mutual fund participation if the absolute value of the difference between the mutual fund's reported acquisition date and the Thomson Reuters's round date is less than 30 days. This matching process leaves us 234 funding rounds across the 195 companies. Panel B shows the fraction of capital invested by mutual funds in each stage level. Acquisition costs are aggregated in each period and decomposed by stage level. The sample consists of 1,573 unique mutual fund-company-security type-tuples (ex: Fidelity Contrafund investing in Dropbox in series C preferred stock). A company is classified as early stage if the company was at either seed or early stage (defined by Thomson Reuters Private Equity) when it received investment from mutual funds. Similarly, a company is classified as expansion stage (later stage) if the company was at expansion stage (later stage or buyout/acquisition stage) when it received investment from mutual funds. Data is based on mutual funds' restricted holdings extracted from EDGAR Form N-30Ds (1995-2005) and Form N-Qs (2006-2016).

Panel A: Percentage of capital provided by mutual funds within each financing round.



Panel B: Percentage of capital invested by mutual funds in each stage.

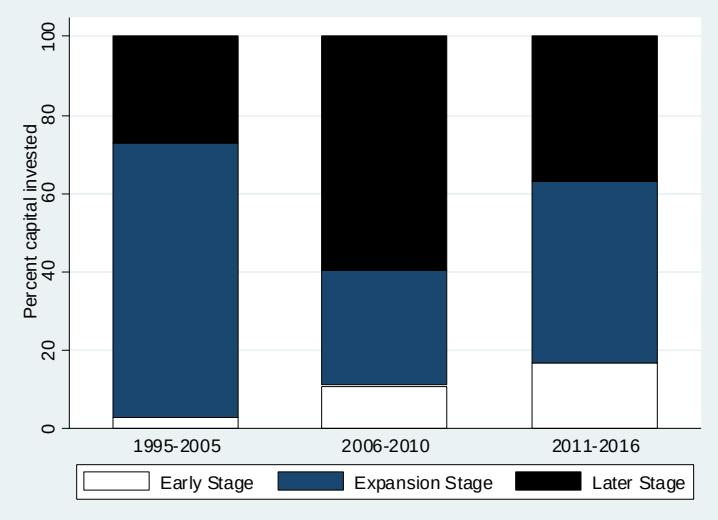


Figure 3: Mutual fund investments in private companies that subsequently went public.

The sample consists of the subset of VC-backed companies, as defined in Table 1, that went public in an IPO between 1995 – 2016. This yields a total of 1,278 IPOs, of which 83 received mutual fund investments prior to the IPO. The bars show the number of VC-backed IPOs with (dark-shaded) and without (lightly-shaded) mutual fund investments prior to the IPO. The line shows the fraction of VC-backed IPOs that also received pre-IPO investments from mutual funds.

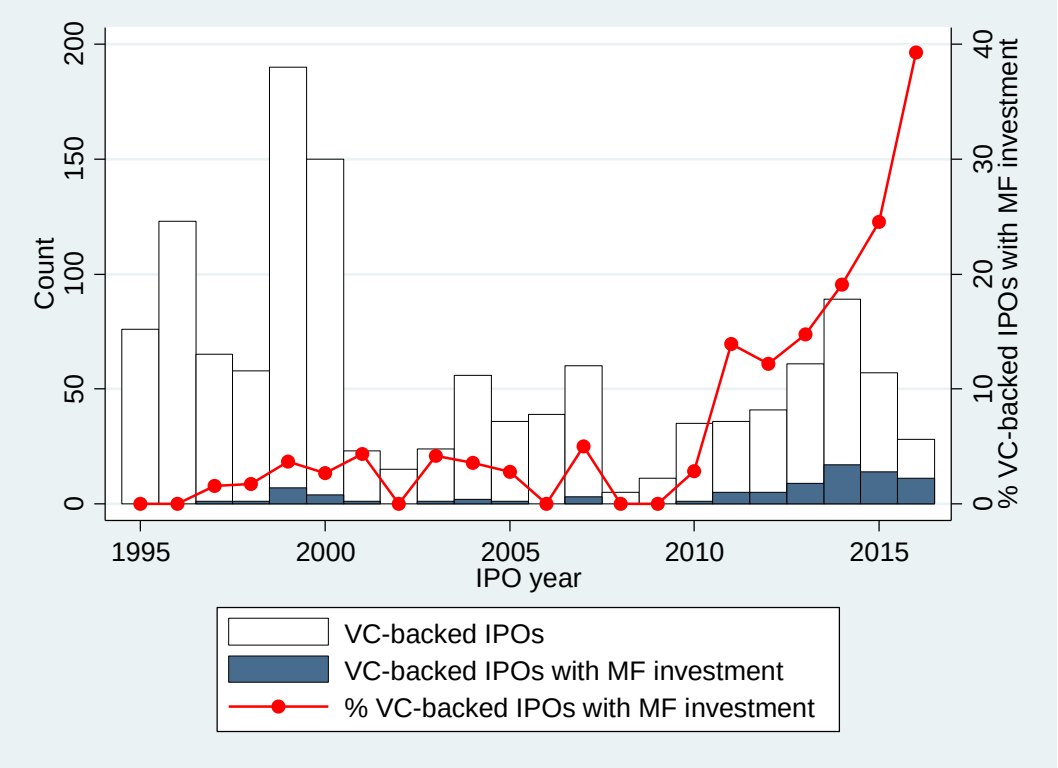
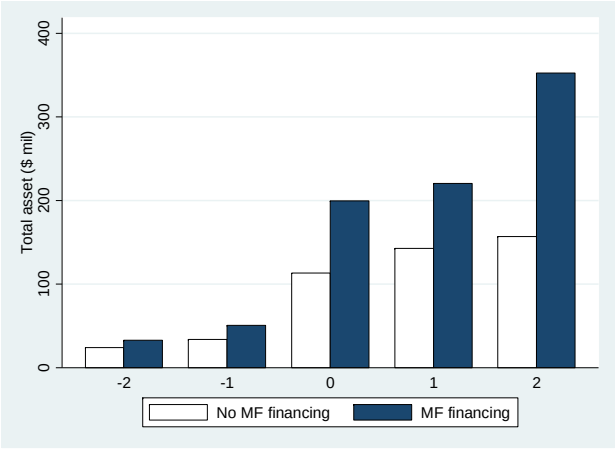


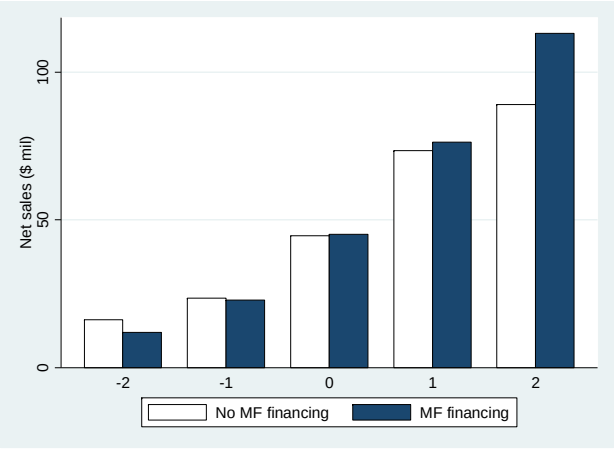
Figure 4: Types of private companies in which mutual funds invest.

The sample consists of the subset of VC-backed companies, as defined in Table 1, that went public in an IPO between 1997 – 2014 (due to the requirement of two years pre- and post-IPO data and the fact that the first company with mutual fund financing to exit via IPO was in in 1997). This yields a total of 994 IPOs, of which 58 received mutual fund investments prior to the IPO. The analysis is based on observations having non-missing values for each variable in Compustat. Panel A, B, C, and D show total assets, sales, expenditures (CAPEX + R&D + SG&A), and gross margin [(Sales – COGS) / Sales], respectively for each fiscal year. Year 0 is the year that includes the IPO. Data comes from Compustat and all numbers represent medians.

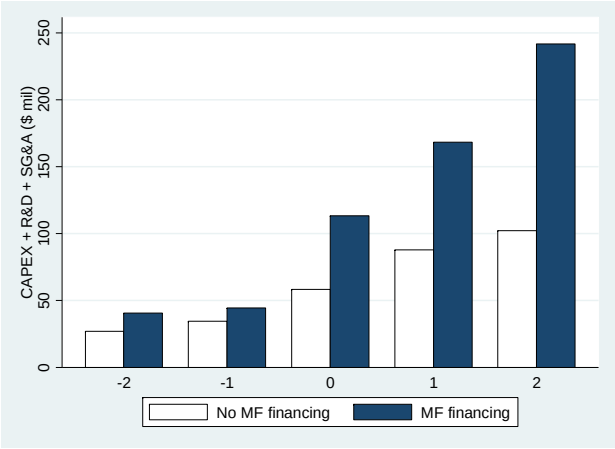
Panel A: Total assets



Panel B: Net sales



Panel C: Expenditures



Panel D: Gross margin

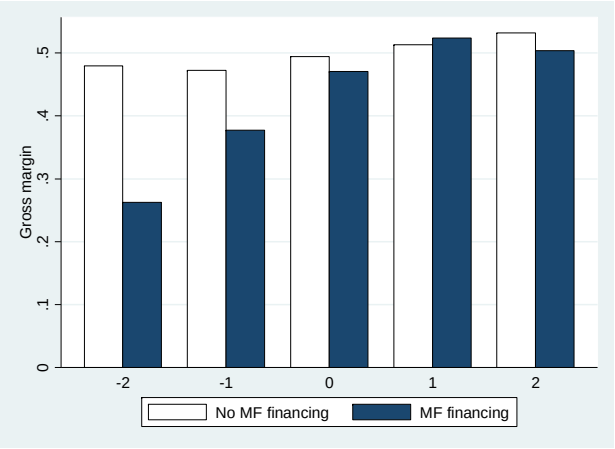
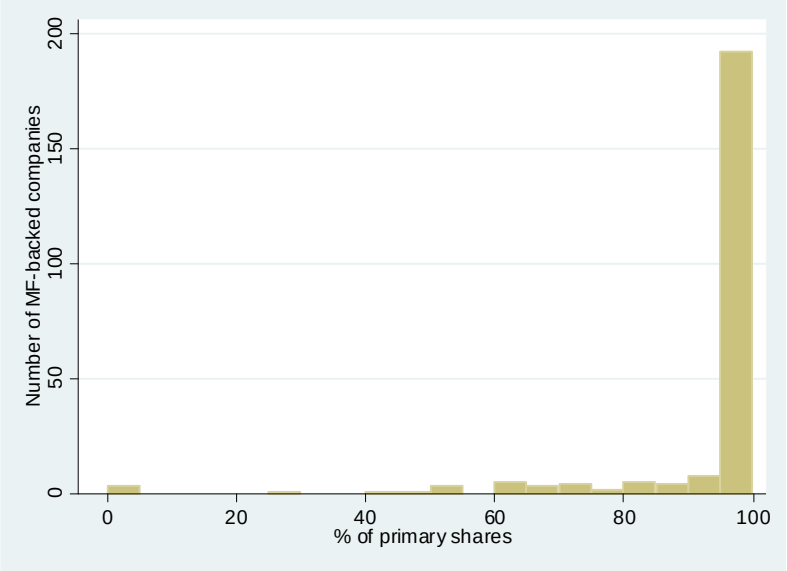


Figure 5: Venture capital round vs. secondary market transaction.

Panel A shows the distribution across private VC-backed firms of mutual funds' holdings by share type. From the initial sample of 270 VC-backed companies that receive mutual fund financing while private, we impose the additional filter that acquisition costs be non-missing, resulting in 232 companies. Percent of primary shares equals (dollar amount of primary shares / total dollar amount invested by mutual fund in the company), where preferred stock is assumed to be primary shares and all other forms of investment (which are predominantly common stock) are assumed to represent secondary shares. In Panel B, mutual fund investments are matched with round dates in Thomson Reuters Private Equity if the absolute difference between mutual funds' acquisition date (form N-30Ds and form N-Qs) and the Thomson Reuters round date is less than 30 days. Panel B shows the distribution of the difference between these dates, conditional on matching. The sample consists of 1,573 unique mutual fund-company-security type-tuples (ex: Fidelity Contrafund investing in Dropbox in series C preferred stock).

Panel A: Distribution across private VC-backed firms: % MF investments that are primary shares.



Panel B: Distribution of mutual fund financing date, relative to VC round date.

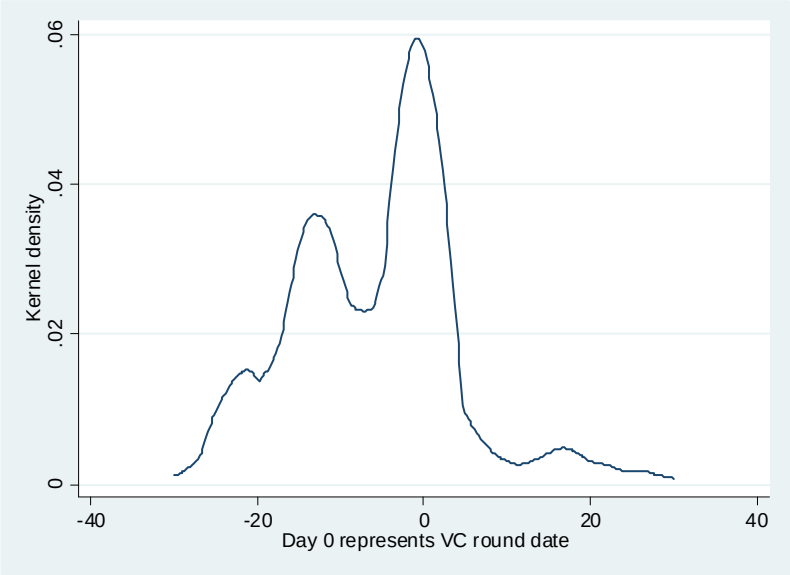
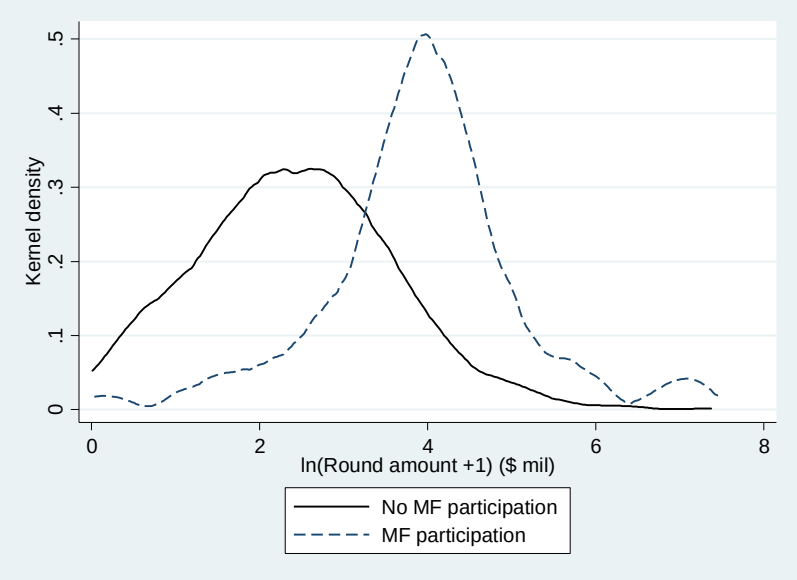


Figure 6: Capital invested in private company funding rounds.

This figure compares round amounts, across rounds with versus without mutual fund participation. In Panel A, from the initial sample of 270 VC-backed companies that receive mutual fund financing while private, we impose the additional filter that round amounts be non-missing, resulting in 195 companies and a total of 1,151 funding rounds where we can match Thomson Reuters round dates with mutual fund investments (based on the same procedure used in Figure 5). Of these 1,151 rounds, 234 include mutual fund participation. Panel B repeats the similar exercise based on Crunchbase data. We first match the 270 companies in Thomson Reuters with companies in Crunchbase, resulting in 762 financing rounds across 184 companies where we can match Crunchbase round dates with mutual fund investments (based again on same procedure used in Figure 5) and where round amounts are non-missing. Of the 762 rounds, 158 include mutual fund participation.

Panel A: Round amounts, across with and without mutual fund participation.



Panel B: Amount of capital raised in venture rounds.

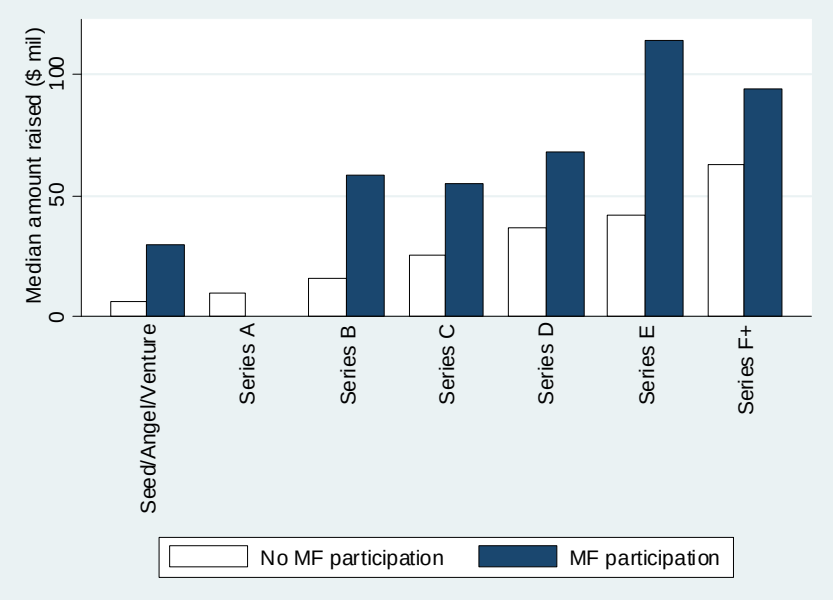
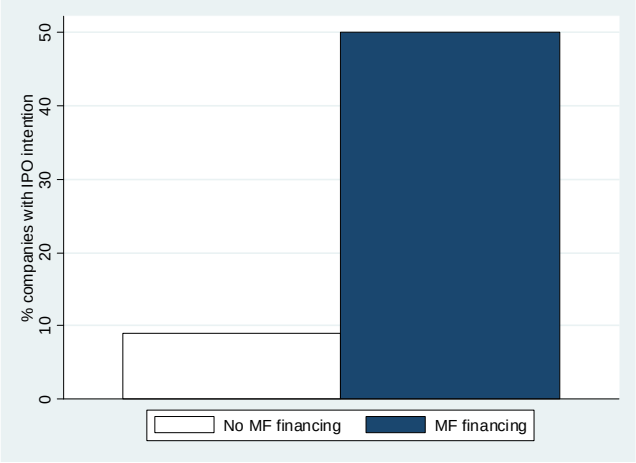


Figure 7: Avoiding IPO vs. delaying IPO.

This figure examines companies' intentions to exit private status. The sample consists of VC-backed companies that received their first round of financing over the 2008-2016 period and who have not exited as of the end of 2016. Companies that do not receive follow-on financing for more than 4 years are defined as failure and excluded from the analysis. To limit the sample to companies that could feasibly go public, we require the average first-round VC to have funded at least 9 companies and to have at least 2.5 successful exits (via IPO or M&A) in the past 3 years, and companies to receive at least 3 financing rounds and to be backed by at least 4 VCs. For company that satisfies these restrictions and which has mutual fund financing prior to the IPO, we retain all non-MF-backed companies with the same first financing round year, development stage, industry, and state. We then select the non-MF-backed company with the smallest difference in Wikipedia pageview count, where this count is measured at the first MF financing date for MF-backed companies and at last financing round date for non-MF-backed companies. For MF-backed companies without a Wikipedia pageview count, we randomly a select non-MF-backed company that similarly has no pageviews. Our final sample consists of 44 companies, 22 of which received mutual fund financing. We search the keyword 'IPO' and 'initial public offering' in each company's Wikipedia webpage, Crunchbase webpage, Google, and the Wall Street Journal. We define intention to go public = 1 if either the CEO, another company executive, or a related venture capitalist clearly mentions an IPO plan at least once during the period 2013-2016.

Panel A: Intention to go public mentioned by any company insider.



Panel B: Intention to go public mentioned by the CEO.

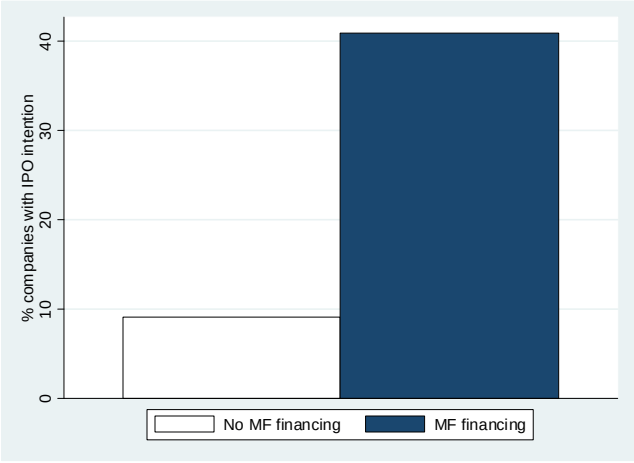
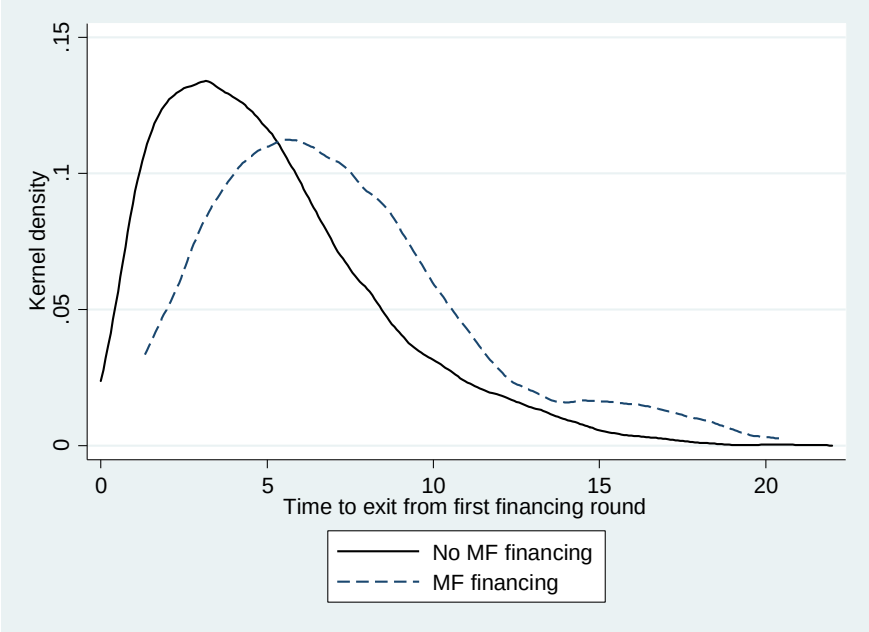


Figure 8: Do companies receiving mutual fund investments stay private longer?

The sample consists of 7,282 unique companies that received their first VC financing in 1990 – 2010 and that exited. Among this subset of companies that have exited, 111 companies received at least one investment from mutual funds. Panel A shows a kernel density plot of time to exit for companies with and without mutual fund financing. Panel B compares median time to exit from the first financing round, for firms with versus without mutual fund financing across all VC-backed companies that exit via either IPO or trade sale. The first and second (third and fourth) sets of bars show time to exit for companies that first received VC financing during 1990-2000 (2001-2010). All numbers represent medians.

Panel A: Time to exit from first financing round (kernel density plot).



Panel B: Time to exit from first VC round (grouped by first VC round year cohort).

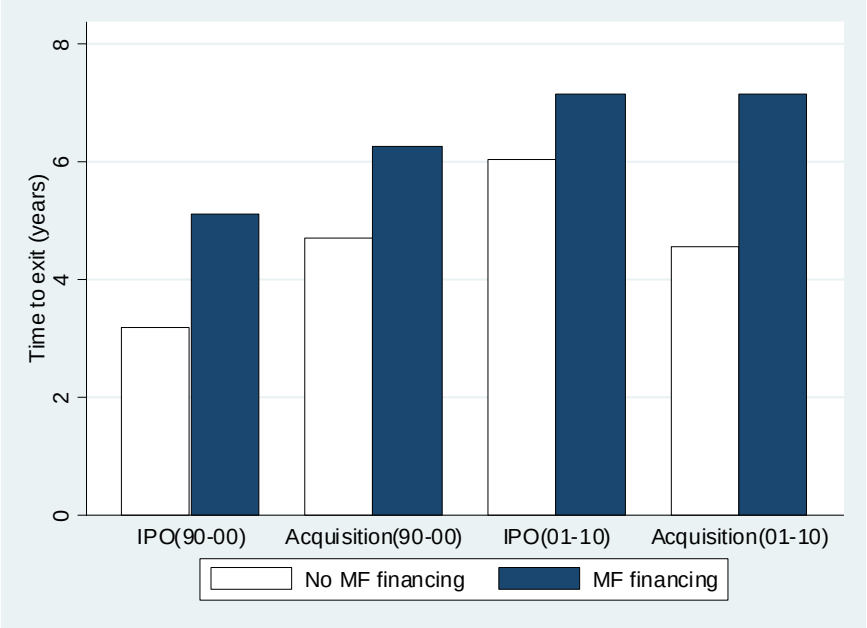
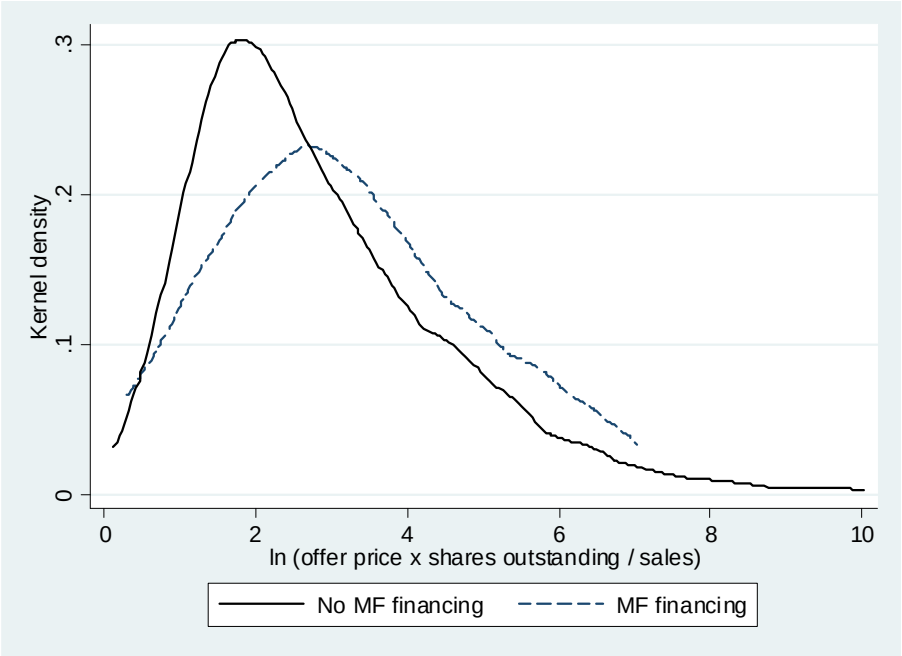


Figure 9: Valuations of IPO firms with versus without Mutual Fund Investment

The sample consists of the subset of VC-backed companies over the 1990 – 2016 period, as defined in Table 1, that went public in an IPO. Companies must also have strictly positive sales in the prior fiscal year to the IPO, yielding a total of 930 companies. Offer price is obtained from SDC and the stock price and the number of shares are obtained from CRSP.

Panel A: Distribution of $\frac{Offer\ Price * Shares\ Outstanding}{Sales}$



Panel B: Distribution of $\frac{Market\ Price_{Day\ 1} * Shares\ Outstanding}{Sales}$

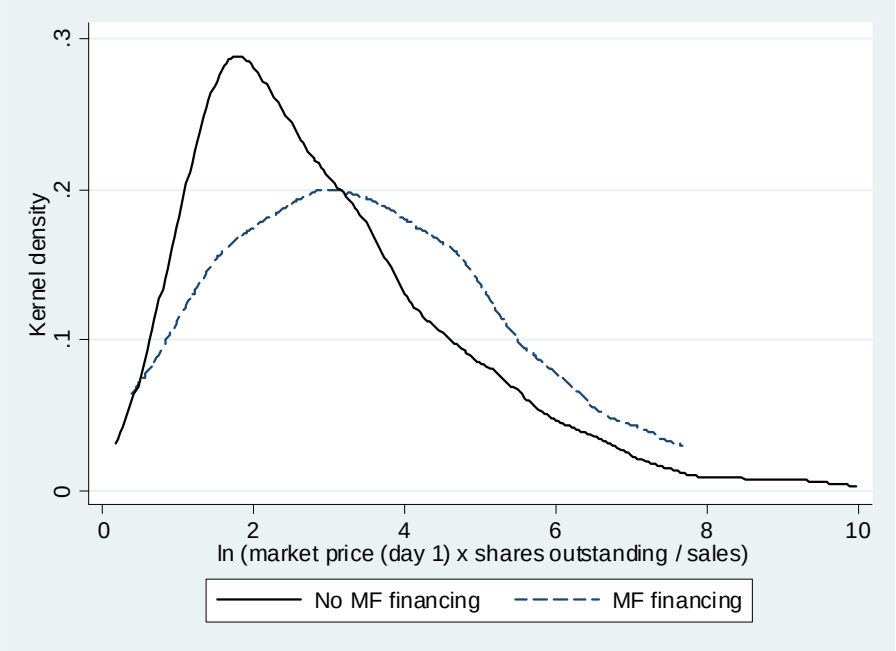


Table 1: Sample Description.

The sample consists of 28,516 unique companies that received venture capital financing between 1990 and 2016. Companies founded prior to 1980, companies that received their first round of VC financing prior to 1990, companies that received mutual fund investments before VC financing, and companies in the buyout/acquisition stage at the time of first financing round are excluded. Panel A categorizes companies by financing year. Column 1 shows the total number of companies receiving VC financing for the first time each year, and column 2 (3) shows the subset of these that subsequently exit via IPO or acquisition (receive mutual fund financing while still private). Column 4 shows the number of private VC-backed companies that receive mutual fund financing each year, and column 5 (6) shows the subset of these that subsequently exit via IPO (exit via acquisition). Panel B categorizes companies by exit year. Column 7 (8) shows the number of companies exiting via IPO (acquisition) each year, and column 9 (10) shows the subset of these that had received mutual fund financing prior to exit.

Panel A: # companies receiving their first financing from venture capital or mutual funds.

Year of Fin'g	From Venture Capital, each year			From Mutual Funds, each year		
	Total	# that subsequently		Total	# that subsequently	
		Exit	Receive MF Fin'g		exit via IPO	exit via acquisition
	(1)	(2)	(3)	(4)	(5)	(6)
1990	302	118	2			
1991	228	103	2			
1992	353	167	5			
1993	311	153	4			
1994	387	203	3			
1995	731	316	9	4	0	2
1996	892	419	16	3	1	0
1997	1,060	432	16	6	0	4
1998	1,339	468	17	6	3	1
1999	1,938	713	27	24	8	5
2000	2,849	933	13	36	3	12
2001	1,020	390	9	12	2	2
2002	709	317	4	2	0	1
2003	704	291	6	1	1	0
2004	885	352	9	6	2	3
2005	995	356	16	7	0	1
2006	1,190	398	8	7	4	0
2007	1,368	404	13	7	1	2
2008	1,273	309	15	11	3	4
2009	784	196	12	2	2	0
2010	1,010	244	9	5	4	0
2011	1,330	209	18	12	9	1
2012	1,327	170	11	15	6	2
2013	1,491	133	13	18	7	2
2014	1,443	64	10	36	15	3
2015	1,456	21	2	46	12	4
2016	1,141	4	1	4	0	0

Year of Fin'g	From Venture Capital, each year			From Mutual Funds, each year		
	Total	# that subsequently		Total	# that subsequently	
		Exit	Receive MF Fin'g		exit via IPO	exit via acquisition
	(1)	(2)	(3)	(4)	(5)	(6)
Full Sample						
1990 - 2016	28,516	7,883	270	270	83	49
Partial Samples						
1990 – 2010	20,328	7,282	215	139	34	37
1995 – 2016	26,935	7,139	254	270	83	49
1995 – 2010	18,747	6,538	199	139	34	37

Panel B: # Exits each year.

	by VC-backed co's		By VC-backed co's with MF investments	
Year of Exit	Via IPO	Via M&A	Via IPO	Via M&A
	(7)	(8)	(9)	(10)
1990	1	0		
1991	10	1		
1992	21	10		
1993	21	18		
1994	34	29		
1995	76	55		
1996	123	75		
1997	65	111	1	1
1998	58	141	1	2
1999	190	180	7	1
2000	150	295	4	4
2001	23	315	1	3
2002	15	281	0	1
2003	24	262	1	1
2004	56	322	2	5
2005	36	352	1	4
2006	39	378	0	3
2007	60	392	3	1
2008	5	343	0	2
2009	11	286	0	1
2010	35	461	1	2
2011	36	434	5	0
2012	41	415	5	2
2013	61	344	9	5
2014	89	431	17	1
2015	57	323	14	4
2016	28	264	11	6
Full Sample:				
1990 – 2016	1,365	6,518	83	49
Partial Samples				
1990 – 2010	1,053	4,307	22	31
1995 – 2016	1,278	6,460	83	49
1995 – 2010	966	4249	22	31

Table 2: Descriptive statistics.

The sample consists of 28,516 unique companies, as described in Table 1. First round VC characteristics are calculated based on the average value of each variable across all VCs that provided funding in the first round. VC funding characteristics and patenting activity variables are measured at min (last financing round date, exit date, first MF financing date). 7,883 companies have exited via either IPO or acquisition by the end of the sample period: 132 companies with mutual fund financing and 7,751 companies without. Means are shown for all variables, and variable definitions are in the Appendix.

	With Mutual Fund Financing Obs = 270	Without Mutual Fund Financing Obs = 28,246	Difference
First-round VC characteristics			
VC Firm Age	17.01	13.96	3.051***
# Cos Invested by VC	40.96	32.29	8.675***
# Exits by VC	16.70	9.94	6.763***
VC funding characteristics			
Rounds Received	4.46	3.12	1.340***
VC Syndicate Size	6.69	3.66	3.027***
Amount raised ($ mil)	97.40	21.96	75.430***
Amount raised at first round ($ mil)	10.57	5.02	5.545***
Patenting activity			
Patents applied	6.73	2.51	4.214***
Patents applied (scaled)	1.40	0.54	0.861***
At least one patent applied	0.53	0.28	0.248***
Industry			
Computer	0.44	0.51	-0.073**
Medical	0.06	0.10	-0.038**
Biotech	0.26	0.06	0.191***
Communication	0.12	0.11	0.010
OtherElect	0.04	0.05	-0.010
NonHighTech	0.09	0.17	-0.0848***
Geographical location			
CA	0.51	0.35	0.162***
MA	0.14	0.09	0.058***
NY	0.07	0.08	-0.010
TX	0.01	0.05	-0.045***
PA	0.01	0.05	-0.040***
Exit performance			
Dummy = 1 if exited	0.49	0.27	0.214***
Dummy = 1 if exited via IPO	0.31	0.05	0.262***
Dummy = 1 if exited via M&A	0.18	0.23	-0.047*
Time to exit from first financing round	6.54	4.89	1.645***
Time to IPO from first financing round	6.08	4.46	1.628***
Time to M&A from first financing round	7.31	4.98	2.327***

Table 3: Determinants of mutual fund investments.

The sample consists of 28,516 unique companies, as described in Table 1. Each column shows an OLS regression, where the dependent variable equals 1 if the firm received mutual fund financing while private, zero otherwise. The sample in column 1 equals the full sample of 28,516 private companies. In column 2, the sample is restricted to companies with a minimum of two rounds of venture capital financing. Column 3 adds the additional requirement that there are two or more VCs in the syndicate. Finally, column 4 adds the requirement that the amount of capital raised in the first financing round is above the median (compared to the set of first VC round financings in the same calendar year). Full variable descriptions are provided in the Appendix II. Robust *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	(1) I(MF financing)	(2) I(MF financing)	(3) I(MF financing)	(4) I(MF financing)
First-round VC characteristics				
ln(VC firm age)	-0.001	-0.001	-0.001	-0.001
	(-0.835)	(-0.750)	(-0.767)	(-0.552)
ln(# Companies funded by VC)	-0.000	-0.000	-0.000	0.001
	(-0.101)	(-0.135)	(-0.400)	(0.612)
ln(# Exits by VC)	0.002***	0.003**	0.004**	0.002
	(2.847)	(2.286)	(2.422)	(0.669)
VC funding characteristics				
ln(Syndicate size)	0.010***	0.012***	0.014***	0.012***
	(6.609)	(5.659)	(5.205)	(3.141)
ln(Amount raised at first round)	0.003***	0.004***	0.004***	0.011***
	(3.613)	(2.995)	(2.789)	(3.567)
Time b/w 1st and 2nd round		-0.002***	-0.002***	-0.004***
		(-4.096)	(-3.826)	(-5.651)
Patenting activity				
ln(# Patents applied)	0.006***	0.007***	0.006***	0.007**
	(3.143)	(2.709)	(2.599)	(1.982)
Observations	28,516	18,087	16,624	9,356
R-squared	0.018	0.019	0.019	0.023
Specification	OLS	OLS	OLS	OLS
First VC round	1990-2016	1990-2016	1990-2016	1990-2016
Co's with MF investment	270	244	241	164
Stage level FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
First VC round year FE	Yes	Yes	Yes	Yes
Restriction	None	Min 2 VC rounds	Min 2 VC rounds + VC Syn >= 2	Min 2 VC rounds + VC Syn >= 2 + Amt raised above median

Table 4: Do mutual fund investments increase total capital raised?

The sample consists of VC-backed private firms as described in Table 1. Column 1 imposes the additional criteria that the lead VC serves in this role for at least two companies to enable the inclusion of lead VC fixed effects, and for which round amount is non-missing. This results in 71,341 rounds across 25,109 unique companies. Columns 2 – 4 are based only on the 1,147 rounds across the subset of companies that receive mutual fund investment in at least one round. We define a round as including mutual fund participation if the absolute value of the difference between the mutual fund's reported acquisition date and the Thomson Reuters's round date is less than 30 days. Columns 1 and 2 shows OLS regressions. Columns 3 and 4 show the first- and second-stage regressions from a 2SLS specification, where the number of VCs with a mutual fund connection instruments for mutual fund participation. A VC is defined to have a connection with a mutual fund if the VC has jointly invested in another private company with a mutual fund investor in the past 5 years. In Panel A (Panel B), mutual fund participation is measured as an indicator variable (natural log of amount raised from mutual funds). Across all specifications, round amounts are expressed in millions of dollars, and standard errors are clustered at firm level. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Dummy variable as mutual fund investment measure.

	All private VC-backed co's	Companies with mutual fund financing in at least one round		
VARIABLES	ln(Round size)	ln(Round size)	I(MF in round)	ln(Round size)
I(MF in round)	1.046***	0.714***		1.483***
	(14.080)	(8.117)		(7.738)
# VCs with MF connection			0.047***	
			(8.389)	
Time-varying VC characteristics				
ln(VC firm age)	0.081***	0.008	0.094***	-0.082
	(9.415)	(0.104)	(2.698)	(-0.894)
ln(# Companies funded by VC)	-0.052***	0.080	-0.036	0.096
	(-7.151)	(0.950)	(-1.435)	(1.121)
ln(# Exits by VC)	0.202***	0.179*	-0.054*	0.214**
	(25.172)	(1.719)	(-1.924)	(2.004)
Time-varying firm characteristics				
Time since first round	-0.017***	-0.094***	0.007	-0.099***
	(-4.717)	(-3.560)	(0.887)	(-3.455)
ln(Rounds received)	-0.226***	0.216	-0.038	0.251
	(-15.361)	(1.421)	(-0.863)	(1.631)
ln(Syndicate size)	0.271***	0.235**	-0.044	0.209*
	(22.624)	(2.062)	(-1.299)	(1.770)
ln(Amount raised)	0.198***	0.041	0.068***	-0.016
	(26.739)	(0.575)	(4.625)	(-0.210)
ln(# Patents applied)	0.131***	0.124*	0.013	0.116
	(12.844)	(1.859)	(0.537)	(1.647)
Inside round	-0.840***	-0.908***	-0.045	-0.781***
	(-102.237)	(-11.776)	(-1.546)	(-8.826)
Observations	71,341	1,147	1,147	1,147
R-squared	0.500	0.618	0.446	0.581
Specification	OLS	OLS	OLS	2SLS
Stage level FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Lead VC FE	Yes	Yes	Yes	Yes
Financing round year FE	Yes	Yes	Yes	Yes
First-stage F-stat				70.37

Panel B: Amount raised from mutual funds as mutual fund investment measure.

VARIABLES	All private VC-backed co's	Companies with mutual fund financing in at least one round		
	ln(Round size)	ln(Round size)	ln(Amt raised from MF)	ln(Round size)
ln(Amount raised from MF)	0.416***	0.301***		0.674***
	(20.075)	(10.744)		(6.806)
# VCs with MF connection			0.103***	
			(6.664)	
Time-varying VC characteristics				
ln(VC firm age)	0.080***	-0.028	0.346***	-0.176*
	(9.307)	(-0.363)	(3.710)	(-1.795)
ln(# Companies funded by VC)	-0.052***	0.092	-0.124	0.127
	(-7.093)	(1.124)	(-1.508)	(1.446)
ln(# Exits by VC)	0.201***	0.198*	-0.188**	0.261**
	(25.191)	(1.934)	(-2.141)	(2.445)
Time-varying firm characteristics				
Time since first round	-0.016***	-0.091***	0.007	-0.092***
	(-4.669)	(-3.565)	(0.337)	(-3.368)
ln(Rounds received)	-0.226***	0.229	-0.134	0.284*
	(-15.407)	(1.566)	(-0.971)	(1.875)
ln(# Investors)	0.273***	0.270**	-0.205*	0.282**
	(22.981)	(2.484)	(-1.861)	(2.461)
ln(Amount raised)	0.196***	0.013	0.256***	-0.088
	(26.832)	(0.194)	(4.709)	(-1.115)
ln(# Patents applied)	0.132***	0.144**	-0.035	0.159**
	(12.930)	(2.222)	(-0.507)	(2.196)
Inside round	-0.840***	-0.916***	-0.102	-0.779***
	(-102.440)	(-12.574)	(-1.229)	(-8.909)
Observations	71,341	1,147	1,147	1,147
R-squared	0.500	0.630	0.433	0.562
Specification	OLS	OLS	OLS	2SLS
Stage level FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Lead VC FE	Yes	Yes	Yes	Yes
Financing round year FE	Yes	Yes	Yes	Yes
First-stage F-stat				44.41

Table 5: Relations between mutual fund financing and company outcomes.

The sample consists of VC-backed private firms as described in Table 1, with the additional criteria that the lead VC serve in this role for at least two companies to enable the inclusion of lead VC fixed effects. This results in 26,989 companies, of which 261 received at least one investment from mutual funds. In columns 1 and 2, the dependent variable equals one if the firm has not exited (via either IPO or acquisition) and has not received a funding round for at least four years prior to the end of the sample period. In columns 3 and 4, the dependent variable equals one if the firm exits via IPO. Columns 5 – 6 further limit the sample to companies that exited via either IPO or M&A, resulting in 6,986 companies. For columns 5 and 6, the dependent variable equals ln(time to exit), measured as number of years from the first financing round to exit. Robust t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

VARIABLES	(1) Failure	(2) Failure	(3) Exit via IPO	(4) Exit via IPO	(5) ln(Time to exit)	(6) ln(Time to exit)
I(MF financing)	-0.060**		0.195***		0.165***	
	(-2.306)		(6.808)		(4.106)	
ln(Amount raised from MF)		-0.034***		0.078***		0.044***
		(-5.153)		(7.638)		(3.175)
First-round VC characteristics						
ln(VC firm age)	-0.032***	-0.032***	0.010**	0.010**	0.014	0.015
	(-3.543)	(-3.534)	(2.066)	(2.060)	(0.708)	(0.715)
ln(# Companies funded)	0.013***	0.013***	-0.003	-0.003	-0.053***	-0.053***
	(2.667)	(2.649)	(-1.247)	(-1.149)	(-3.841)	(-3.810)
ln(# Exits)	-0.005	-0.005	0.001	0.001	0.064***	0.064***
	(-0.838)	(-0.839)	(0.322)	(0.311)	(4.375)	(4.349)
VC funding characteristics						
ln(Syndicate size)	-0.253***	-0.253***	0.043***	0.043***	0.399***	0.400***
	(-42.436)	(-42.391)	(12.467)	(12.424)	(29.382)	(29.418)
ln(Amt raised at first round)	-0.018***	-0.018***	0.008***	0.008***	-0.038***	-0.038***
	(-5.155)	(-5.121)	(4.002)	(3.926)	(-4.587)	(-4.634)
Patenting activity						
ln(# Patents applied)	-0.081***	-0.081***	0.033***	0.032***	0.170***	0.170***
	(-12.376)	(-12.318)	(7.033)	(6.938)	(13.720)	(13.694)
Observations	26,989	26,989	26,989	26,989	6,986	6,986
R-squared	0.394	0.394	0.200	0.204	0.423	0.422
Specification	OLS	OLS	OLS	OLS	OLS	OLS
Co's with MF investment	261	261	261	261	126	126
Stage level FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC FE	Yes	Yes	Yes	Yes	Yes	Yes
First VC round year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Causal effects of mutual fund financing

The sample consists of the 6,986 VC-backed companies that exited via either IPO or M&A, as used in Columns 5 and 6 of Table 5. Columns 1 and 2 show the first- and second-stage of a two-stage least squares (2SLS) regression, where the dependent variables are a dummy equal to one if the firm received mutual fund financing and the natural logarithm of the time (number of years) to exit from the first financing round, respectively. Columns 3 and 4 are similar, with the exception that ln(amount raised from mutual funds) is used as the measure of mutual fund participation. The number of VCs with a mutual fund connection is used as an instrument for the mutual fund financing measure, where a VC is defined to have a connection with a mutual fund if the VC has jointly invested in another company with a mutual fund in the past 5 years. In panel B, the sample is broadened to the 26,989 unique VC-backed private firms as used in columns 1 – 4 of Table 5. Column 1 (4) is the first-stage regression for columns 2 and 3 (5 and 6). In columns 1-3, mutual fund financing is measured by a dummy variable, and in columns 4-6, mutual fund financing is measured by the natural logarithm of capital invested by mutual funds in the company. Robust t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Effects on Time to Exit.

	1st stage	2nd stage	1st stage	2nd stage
	I(MF financing)	ln(Time to exit)	ln(Amt raised from MF)	ln(Time to exit)
I(MF financing)		0.310***		
		(2.826)		
ln(Amount raised from MF)				0.121***
				(2.700)
# VCs with MF connections	0.032***		0.081***	
	(9.302)		(7.509)	
First-round VC characteristics				
ln(VC firm age)	0.008*	0.013	0.027*	0.013
	(1.839)	(0.650)	(1.882)	(0.615)
ln(# Companies funded)	-0.001	-0.053***	-0.010	-0.052***
	(-0.346)	(-3.854)	(-1.038)	(-3.781)
ln(# Exits)	-0.006	0.065***	-0.011	0.064***
	(-1.538)	(4.400)	(-0.968)	(4.358)
VC funding characteristics				
ln(Syndicate size)	-0.035***	0.397***	-0.088***	0.396***
	(-7.067)	(28.696)	(-5.803)	(28.593)
ln(Amt raised at first round)	-0.003	-0.037***	-0.003	-0.038***
	(-1.414)	(-4.519)	(-0.431)	(-4.593)
Patenting activity				
ln(# Patents applied)	0.001	0.169***	0.009	0.168***
	(0.259)	(13.572)	(0.575)	(13.338)
Observations	6,986	6,986	6,986	6,986
R-squared	0.301	0.422	0.261	0.420
Specification	OLS	2SLS	OLS	2SLS
Co's with MF investment	126	126	126	126
Stage level FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Lead VC FE	Yes	Yes	Yes	Yes
First VC round year FE	Yes	Yes	Yes	Yes
First-stage F-stat		86.53		56.39

Panel B: Effects on form of exit.

VARIABLES	(1) I(MF financing)	(2) Failure	(3) Exit via IPO	(4) ln(Amt raised from MF)	(5) Failure	(6) Exit via IPO
I(MF financing)		0.014	0.274***			
		(0.179)	(4.270)			
ln(Amount raised from MF)					0.005	0.104***
					(0.179)	(4.215)
# VCs with MF connections	0.024***			0.064***		
	(12.957)			(10.479)		
First-round VC characteristics						
ln(VC firm age)	0.005**	-0.032***	0.010**	0.013**	-0.032***	0.010**
	(2.087)	(-3.568)	(2.019)	(2.155)	(-3.568)	(2.019)
ln(# Companies funded)	-0.002	0.013***	-0.003	-0.007**	0.013***	-0.003
	(-1.549)	(2.661)	(-1.260)	(-2.259)	(2.665)	(-1.127)
ln(# Exits)	-0.004***	-0.005	0.001	-0.010**	-0.005	0.001
	(-2.587)	(-0.829)	(0.341)	(-2.246)	(-0.829)	(0.322)
VC funding characteristics						
ln(Syndicate size)	-0.027***	-0.254***	0.043***	-0.068***	-0.254***	0.042***
	(-10.714)	(-42.213)	(12.379)	(-8.916)	(-42.140)	(12.352)
ln(Amt raised at first round)	0.002	-0.018***	0.008***	0.006*	-0.018***	0.008***
	(1.520)	(-5.189)	(3.920)	(1.745)	(-5.188)	(3.821)
Patenting activity						
ln(# Patents applied)	0.002	-0.082***	0.032***	0.012*	-0.082***	0.032***
	(1.194)	(-12.408)	(6.890)	(1.695)	(-12.381)	(6.768)
Observations	26,989	26,989	26,989	26,989	26,989	26,989
R-squared	0.188	0.394	0.199	0.157	0.394	0.202
Specification	OLS	2SLS	2SLS	OLS	2SLS	2SLS
Co's with MF investment	261	261	261	261	261	261
Stage level FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC FE	Yes	Yes	Yes	Yes	Yes	Yes
First VC round year FE	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-stat		167.9	167.9		109.8	109.8

Table 7: Mutual funds' returns, to investing in private firms

For each of the 149 funds that invested in private firms over the 1995 – 2016 period, Panel A tabulates the percent of the fund's investments that exited via IPO or M&A. The table shows the rates for the 25th, 50th, and 75th percentile fund as well as the mean exit rate across all mutual funds, meaning observations are at the fund-level. Panel B shows the returns on mutual fund investments, across the private firms with mutual fund investments that subsequently went public. Thus, observations are at the fund – company – security level (ex: Fidelity Contrafund's investment in Dropbox Series A). Return is defined by $\frac{First\ Day\ Closing\ Price - Fund's\ Acquisition\ Cost}{Fund's Acquisition\ Cost}$, assuming that preferred stock converts into common stock at the IPO. Warrants, convertible bonds/notes, and stock units are excluded. It also shows the returns (measured over the same period as the private firm returns) on three market indices: equal-weighted index, value-weighted index, and S&P500. Finally, the last column shows the Pearson correlation between the private firm investments and each of the three market indices, based on monthly returns in each, where ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A: Percent of each mutual fund's investments that exited private status.

	Quartile 1 Fund	Median Fund	Quartile 3 Fund	Mean Fund
First VC round date 1990 – 2016, n = 149 funds				
% MF inv'ts that exited via IPO	0%	33.3%	66.6%	41.2%
% MF inv'ts that exited via M&A	0%	0%	10.7%	10.9%
First VC round date 1990 – 2000, n = 52 funds				
% MF inv'ts that exited via IPO	0%	0%	50%	28.5%
% MF inv'ts that exited via M&A	0%	20%	50%	29.5%
First VC round date 2001 – 2010, n = 121 funds				
% MF inv'ts that exited via IPO	20%	42.9%	78.6%	47.3%
% MF inv'ts that exited via M&A	0%	0%	6.3%	4.2%
First VC round date 2011 – 2016, n = 63 funds				
% MF inv'ts that exited via IPO	0%	25%	52.9%	34.8%
% MF inv'ts that exited via M&A	0%	0%	0%	1.5%

Panel B: Returns on mutual funds' private firm investments, versus public market indices

Private firms with MF inv'ts, (n = 646 fund-co inv'ts)	Quartile 1	Median	Quartile 3	Mean	Corr (return on MF inv'ts in private firms, return on alt. benchmarks)
Raw return	17.61%	125.82%	321.31%	438.10%	
# Months: fund acquis date to IPO date	8.1	12.9	25.1	19.6	
Monthly returns	1.35%	4.08%	9.60%	18.31%	
Alternative Benchmarks (monthly return)					
Equal-weighted index	-0.14%	0.75%	1.78%	0.70%	0.139***
Value-weighted index	0.20%	1.05%	1.68%	0.80%	0.096**
S&P 500 index	0.14%	1.07%	1.74%	0.82%	0.079**

Table 8: Other benefits to mutual funds of supplying capital to private firms

This table examines the frequency with which mutual funds hold shares in IPO firms after the IPO, conditional on whether they invested prior to the IPO. The observation level in Panel A is the company – family pair: 83 VC-backed companies that received mutual fund investment while they were private and that subsequently went public × mutual fund families that invested in at least one firm pre-IPO over the 1995 – 2016 period. We limit the sample to fund-family pairs in which the firm went public after the family began investing in private firms. We obtain post-IPO fund holdings from the CRSP mutual fund database for the 2001 – 2016 period, and from Thomson mutual fund database for 1995-2000 period. Post-IPO holdings equal shares held by the fund family at the first post-IPO mutual fund filing date as a fraction of firm shares outstanding. The observation level in Panel B is the company – family pair, but we limit it to the pairs in which the family's affiliated investment banks served as a member of the IPO syndicate (as families are required in these cases to report IPO allocations). Across the 261 pairs, 14 are associated with pre-IPO investment (as shown in the first row) and 247 are not (as shown in the second row). The third row shows statistics for a matched sample of 28 IPOs without pre-IPO investment, where the matching is based on a propensity score approach as described in more detail in the body of the paper. Panel C shows the distribution across private firms held by mutual funds, of mutual funds' valuations, where the sample is restricted to: funds that report value per share, holdings of preferred and common stock, and firms with more than one mutual fund investor reporting a valuation in the same month. Dispersion is calculated as $\frac{Highest\ Valuation - Lowest\ Valuation}{Lowest\ Valuation}$, and is measured at each semi-annual point for which we collect holdings from the underlying mutual fund filings.

Panel A: Distribution of post-IPO holdings.

Percentile	*P1*	*P5*	*P25*	*P50*	*P75*	*P95*	*P99*	*Obs.*
*Sample = mutual fund families that invest pre- IPO in at least 1 company. * companies with pre-IPO investment*								
With pre-IPO inv't	*0%*	*0%*	*0.87%*	*2.84%*	*5.31%*	*15.00%*	*22.46%*	*93*
Without pre-IPO inv't	*0%*	*0%*	*0.21%*	*0.28%*	*0.84%*	*4.93%*	*10.14%*	*214*

Panel B: IPO Allocations.

	Obs.	*% IPO*Fund Family pairs with IPO allocation*	*% IPO shares allocated (at family level, conditional on receiving an allocation)*	
			Mean	*Median*
With pre-IPO inv't	*14*	*64.3%*	*4.7%*	*4.1%*
Without pre-IPO inv't: full sample	*247*	*17.0%*	*1.3%*	*0.3%*
Without pre-IPO inv't: matched sample	*28*	*21.4%*	*2.4%*	*3.0%*

Panel C: Firm-level statistics – dispersion in mutual funds' valuations of private firms.

			Average [median] # entities holding firm		Dispersion in Valuation across Mutual Funds				
	# Firms	# Firm-Periods	# Funds	# Families	Q1	Median	Q3	90th pctl	95th pctl
Private firms held by >1 MF	137	768	6.44 [4.00]	2.15 [1.00]	0.00	0.00	0.12	0.79	1.38

Appendix Tables and Figures

Table A1: Do mutual funds prefer firms in industries with recent successful IPOs?

This table compares proceeds raised and initial returns of VC-backed IPOs with new investments by mutual funds, at the industry level. IPO proceeds are obtained from the SDC Global New Issues database. Mutual fund investments are extracted from EDGAR Form N-30Ds (1995-2005) and Form N-Qs (2006-2016). New investments are calculated by aggregating funds' year *t* acquisition cost minus year *t-1* acquisition cost for each fund-company-security type.

	Correlation between MF investment in industry i in year t and:			
	Aggregate proceeds of VC-backed $IPOs_{indus\ i,\ year\ t}$	Aggregate proceeds of VC-backed $IPOs_{indus\ i,\ year\ t-1}$	Avg IRs of VC-backed $IPOs_{indus\ i,\ year\ t}$	Avg IRs of VC-backed $IPOs_{indus\ i,\ year\ t-1}$
Computer	0.17	0.12	0.08	0.03
Medical	0.05	0.40	0.01	0.13
Biotech	0.83	0.58	0.27	0.27
Communication	0.11	-0.07	0.09	-0.08
OtherElect	0.27	0.22	0.67	0.37
NonHightech	-0.14	-0.12	-0.06	-0.07

Table A2: Determinants of mutual fund investments.

Sample consists of 14,808 companies that received venture capital financing between 2005 and 2016. Companies founded prior to 1980, companies that received their first round of VC financing prior to 1990, companies that received mutual fund investments before VC financing, and companies in the buyout/acquisition stage at the time of first financing round are excluded. Each column shows an OLS regression, where the dependent variable equals 1 if the firm received mutual fund financing while private, zero otherwise. The sample in column 1 equals the full sample of 14,808 private companies. In column 2, the sample is restricted to companies with a minimum of two rounds of venture capital financing. Column 3 adds the additional requirement that there are two or more VCs in the syndicate. Finally, column 4 adds the requirement that the amount of capital raised in the first financing round is above the median (compared to the set of first VC round financings in the same calendar year). Full variable descriptions are provided in the Appendix II. Robust *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

VARIABLES	(1) I(MF financing)	(2) I(MF financing)	(3) I(MF financing)	(4) I(MF financing)
ln(VC firm age)	0.000	-0.000	-0.000	0.000
	(0.429)	(-0.205)	(-0.159)	(0.079)
ln(# Companies funded by VC)	0.000	0.001	0.000	0.001
	(0.334)	(0.533)	(0.189)	(0.276)
ln(# Exits by VC)	0.002*	0.003	0.003*	0.002
	(1.735)	(1.474)	(1.684)	(0.604)
ln(Syndicate size)	0.008***	0.010***	0.011***	0.010*
	(4.122)	(3.098)	(2.905)	(1.704)
ln(Amount raised at first round)	0.005***	0.007***	0.006***	0.014***
	(3.820)	(3.143)	(2.837)	(3.114)
ln(# Patents applied)	0.005*	0.006*	0.006	0.002
	(1.716)	(1.659)	(1.626)	(0.303)
Time b/w 1st and 2nd round		-0.004***	-0.004***	-0.008***
		(-5.394)	(-5.179)	(-5.365)
CA	0.004**	0.006**	0.007**	0.008*
	(2.036)	(2.180)	(2.061)	(1.739)
MA	0.010**	0.010*	0.009	0.011
	(2.459)	(1.711)	(1.562)	(1.326)
NY	0.002	0.004	0.005	0.012
	(0.627)	(1.029)	(1.083)	(1.564)
TX	-0.004***	-0.008***	-0.008***	-0.010***
	(-3.746)	(-4.013)	(-3.705)	(-2.969)
PA	0.001	-0.001	-0.004*	-0.013***
	(0.586)	(-0.567)	(-1.810)	(-3.160)
Observations	14,808	8,690	7,952	4,619
R-squared	0.027	0.030	0.030	0.037
Specification	OLS	OLS	OLS	OLS
First VC round	2005-2016	2005-2016	2005-2016	2005-2016
Co's with MF investment	128	116	114	88
Stage level FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
First VC round year FE	Yes	Yes	Yes	Yes
Restriction	None	Min 2 VC rounds	Min 2 VC rounds + VC Syn >= 2	Min 2 VC rounds + VC Syn >= 2 + Amt raised above median

Table A3: Type of IPO firm in which mutual funds invested prior to the IPO.

The sample consists of the subset of VC-backed companies, as defined in Table 1, that went public in an IPO between 1997 – 2014 (due to the requirement of two years pre- and post-IPO data). This yields a total of 994 IPOs, of which 58 received mutual fund investments prior to the IPO. Regressions are based on the subset with non-missing values for each dependent variable in Compustat. Columns 1 – 6 compare the variables around the IPO (year -2 through +2, where year 0 is the fiscal year that includes the IPO). I(IPO and beyond) is a dummy variable that equals to 1 in the IPO year and beyond, 0 otherwise. Stage level, location, industry, as well as first VC round year and IPO year fixed effects are also included in all specifications. Total assets and sales are in $ million. Robust t-statistics are reported in parenthesis. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

VARIABLES	(1) Total assets	(2) Net sales	(3) Expenditure	(4) Gross margin	(5) Expenditure / TA	(6) Cash / TA
I(MF financing)	73.673	23.567	-18.024	21.080***	0.320	0.058**
	(0.988)	(0.538)	(-0.506)	(2.577)	(0.606)	(2.349)
I(IPO and beyond)	151.756***	52.932***	38.288***	3.023	-1.225***	0.077***
	(4.660)	(4.006)	(3.017)	(0.825)	(-8.017)	(9.327)
I(MF financing)*I(IPO and beyond)	1,007.784**	354.353**	501.056***	-25.736*	-0.211	-0.059**
	(2.362)	(2.283)	(2.825)	(-1.646)	(-0.381)	(-2.006)
ln(VC firm age)	-40.278	32.907*	-5.274	5.608	-0.325**	-0.051***
	(-1.001)	(1.717)	(-0.273)	(1.534)	(-2.482)	(-4.345)
ln(# Companies funded)	-36.174	-43.443	34.804**	-0.196	-0.077	-0.009
	(-0.823)	(-1.533)	(2.456)	(-0.044)	(-0.578)	(-0.903)
ln(# Exits)	36.052	33.051	-31.001**	-2.057	0.018	0.044***
	(0.758)	(1.222)	(-2.174)	(-0.627)	(0.134)	(3.917)
ln(Syndicate size)	-260.092***	-169.342***	-53.816***	-1.777	0.309**	0.134***
	(-5.895)	(-6.042)	(-3.861)	(-0.728)	(2.273)	(14.169)
ln(Amount raised)	241.041***	136.719***	66.281***	-2.209**	-0.003	-0.028***
	(5.369)	(6.410)	(3.950)	(-2.005)	(-0.043)	(-6.674)
ln(# Patents applied)	172.611**	54.943*	103.659***	0.832	-0.263***	0.004
	(1.978)	(1.754)	(3.163)	(0.426)	(-4.469)	(0.959)
Observations	3,941	3,915	2,646	3,629	2,143	3,940
R-squared	0.134	0.185	0.218	0.068	0.098	0.424
Specification	OLS	OLS	OLS	OLS	OLS	OLS
First IPO year	1997-2014	1997-2014	1997-2014	1997-2014	1997-2014	1997-2014
Co's with MF investment	45	45	35	42	35	45
Stage level FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
First VC round year FE	Yes	Yes	Yes	Yes	Yes	Yes
IPO year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A4: Do companies with pre-IPO mutual fund investments have higher initial returns?

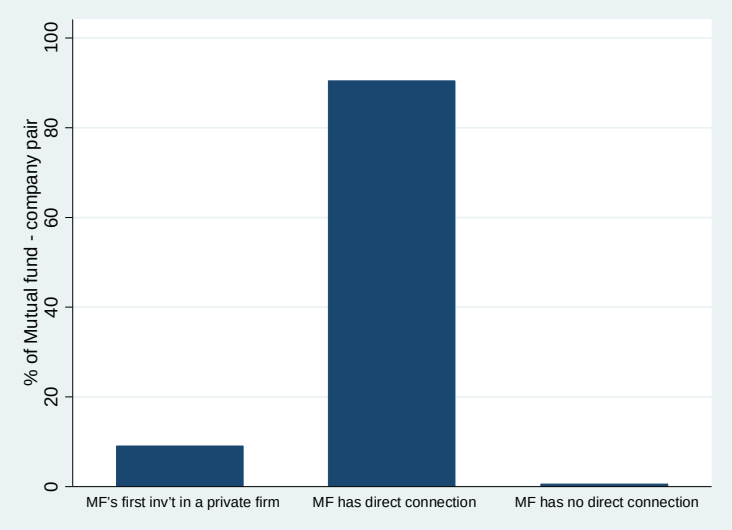
The sample consists of the subset of VC-backed companies, as defined in Table 1, that went public in an IPO between 1995 – 2016. This yields a total of 1,278 IPOs, of which 83 received mutual fund investments prior to the IPO. Initial return is defined as [(first trading day closing price – offer price) / offer price]*100. The Bubble period is defined from September 1998 to August 2000 (see Lowry Officer Schwert, 2010). Robust *t*-statistics are reported in parenthesis. *, **, and *** denote statistical significance at 10%, 5%, and 1% levels, respectively.

	(1) Initial return	(2) Initial return	(3) Initial return	(4) Initial return
I(MF financing)	22.875**	37.916*	9.874	-0.908
	(2.107)	(1.699)	(1.492)	(-0.064)
UW rank	3.663*	3.475*	2.654**	2.767**
	(1.819)	(1.707)	(2.239)	(2.269)
ln(Shares offered)	-0.167	-1.545	-2.298	-0.898
	(-0.030)	(-0.257)	(-0.686)	(-0.249)
NYSE	15.080	14.725	4.754	4.856
	(1.023)	(1.003)	(0.521)	(0.523)
Nasdaq	13.306	13.144	0.680	0.365
	(0.946)	(0.942)	(0.086)	(0.046)
|Price update|	0.996***	0.983***	0.301***	0.310***
	(6.098)	(6.064)	(3.560)	(3.627)
ln(VC firm age)	1.097	0.896	12.414***	12.793***
	(0.171)	(0.139)	(2.847)	(2.886)
ln(# Companies funded)	-2.082	-2.065	-0.122	-0.190
	(-0.499)	(-0.497)	(-0.041)	(-0.063)
ln(# Exits)	3.521	3.540	-2.151	-2.239
	(0.806)	(0.815)	(-0.768)	(-0.798)
ln(Syndicate size)	-2.470	-2.610	-7.705**	-8.043**
	(-0.446)	(-0.473)	(-2.438)	(-2.489)
ln(Amount raised)	0.894	0.999	2.124	2.158
	(0.358)	(0.403)	(1.343)	(1.332)
ln(# patents applied)	-1.285	-1.094	0.621	0.463
	(-0.431)	(-0.365)	(0.264)	(0.194)
Observations	936	936	664	664
Restriction	Full sample		Excluding bubble period	
R-squared	0.507	0.505	0.390	0.385
Specification	OLS	2SLS	OLS	2SLS
Co's with MF investment	63	63	51	51
State FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Lead VC FE	Yes	Yes	Yes	Yes
IPO year FE	Yes	Yes	Yes	Yes
First-stage F-stat		66.74		31.08

Figure A1: Mutual funds' relationship with VCs at time of mutual fund's first investment in a private company.

The sample consists of 270 unique companies that received investments from 929 unique VCs and 150 unique mutual funds while they were private. In total there are 1,103 unique mutual fund – private company pairs. A pair is defined as: "MF's first invt in a private firm" if the mutual fund did not previously invest in any private company; "MF has direct connection" if the fund previously invested in a private company that was backed by the same VC; and, "MF has no direct connection" if the fund previously invested in a private company but the VCs providing funding to the prior company(ies) are not also funding this company. In Panel A, we define "MF has direct connection" based on all VCs providing funding. In Panel B, we define "MF has direct connection" only if one of the VCs backing the current company was the lead VC in a prior company to which the mutual fund provided financing.

Panel A: *Mutual fund defined as having a direct connection if a VC providing funding to current company was a member of the VC syndicate for another company to which mutual fund providing financing.*



Panel B: Mutual fund defined as having a direct connection if a VC providing funding to current company was the lead VC on another company to which mutual fund providing financing.

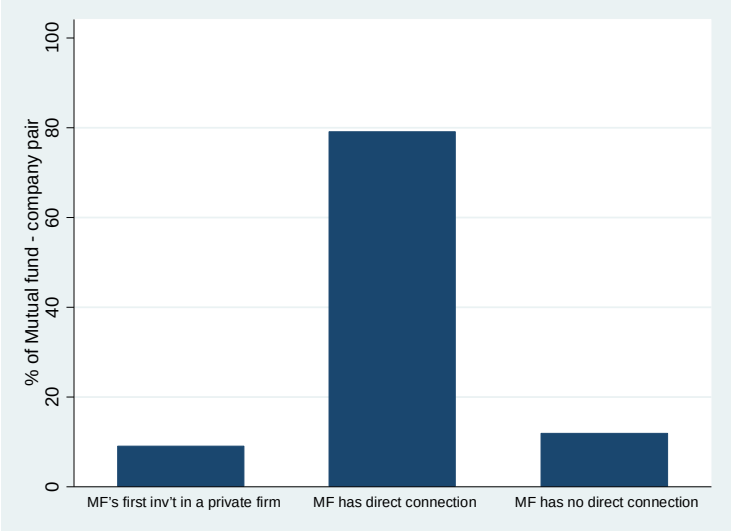


Figure A2: IPO initial returns across firms with vs without pre-IPO mutual fund investments.

The sample consists of the subset of VC-backed companies, as defined in Table 1, that went public in an IPO between 1995 – 2016. This yields a total of 1,278 IPOs, of which 83 received mutual fund investments prior to the IPO. Initial return is defined as [(first trading day closing price – offer price) / offer price]*100.