Venture Capital Limited Partnership Agreements: Understanding Compensation Arrangements

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This Article uses a hand-collected dataset of venture capital partnership agreements to study venture capitalist (VC) compensation. Several new findings emerge. First, VC compensation consists of three elements, not two (management fee and carried interest), as commonly believed. The third element is the value-of-distribution rules that specify when during the fund's life VCs receive distributions. These rules often generate an interest-free loan to VCs from limited partners. A shift from the most popular distribution rule to the second-most popular rule can affect VC compensation as much as or more than common variations in management fee (from 2 percent to 2.5 percent of committed capital) or carried interest (from 20 percent to 25 percent of fund profit). Second, VC compensation is often more complex and manipulable than it could have been. However, more complex management-fee provisions predict lower *total compensation; thus, complexity is not used to camouflage high pay. Third, common proxies for VC quality predict higher levels of the more transparent forms of VC compensation (carried interest and management fee) but do not predict the levels of opaque compensation (interest-free loan, as determined by distribution rules). Fourth, long-term VC performance predicts fund size (which in turn predicts VC pay, controlling for fund size), but recent performance does not predict changes in fund size. Finally, VC compensation is less performance-based than commonly believed: for vintage years between 1986 and 1997 (most recent years for fully liquidated funds), about half of total VC compensation comes from the nonrisky management fee. On average, a 1 percent increase in fund returns predicts a 0.47 percent increase in total VC compensation; this pay-performance elasticity is similar to that of public company CEOs during the same years.*

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INTRODUCTION

A large body of theoretical and empirical studies concentrates on the relationship between venture capitalists (VCs) and entrepreneurs who run young companies, yet very little is written on the relationship between VCs and investors in venture funds. That is, there is a wealth of knowledge on how the venture capital industry creates its product (young companies), but not on how it governs itself or pays its own entrepreneurs—venture capitalists.

In this Article, I examine the compensation of VCs. How VCs are paid is an important topic in its own right, especially because, as this Article demonstrates, an important part of their compensation is so opaque that it has largely escaped academic notice.

VC compensation practices also can inform our views of executive compensation in public companies. Executive compensation, particularly its opaqueness and low pay-performance sensitivity, has been the subject of much recent scholarship.[1] One popular view is that executive compensation arrangements reflect legal and institutional barriers to direct shareholder participation in negotiating executive pay.[2] The question then arises: how do compensation arrangements look where investors can directly negotiate executive pay?

The study of VC compensation may present a unique opportunity to test hypotheses about executive pay. Unlike shareholders of public corporations, who must rely on boards to determine executive pay, venture fund investors negotiate compensation terms directly with venture capitalists at the time they sign limited partnership agreements. Venture fund investors are sophisticated and well counseled; due to securities laws restrictions, they are almost exclusively institutions and

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1 For surveys on this topic, see generally John E. Core, Wayne R. Guay, and David F. Larcker, *Executive Equity Compensation and Incentives: A Survey*, 9 Econ Policy Rev 27 (2003) (synthesizing prior research on equity-based compensation, including a discussion of how compensation is used to align incentives, how equity incentives are measured, when such compensation is deployed, and why researchers have argued it ought to be effective); John M. Abowd and David S. Kaplan, *Executive Compensation: Six Questions That Need Answering*, 13 J Econ Perspectives 145 (1999) (explaining recent advances in economics literature on executive compensation); Kevin J. Murphy, *Executive Compensation*, in Orley Ashenfelter and David Card, eds, 3B *Handbook of Labor Economics* 2485 (Elsevier 1999) (describing executive incentive contracts and surveying empirical and theoretical research on executive compensation).

2 For a summary of the recent literature taking this view, see Lucian Arye Bebchuk and Jesse M. Fried, *Executive Compensation As an Agency Problem*, 17 J Econ Perspectives 71, 72 (2003) (arguing that the current use of executive compensation to align the incentives of managers with those of shareholders may not be effective since the process by which executive compensation is set is burdened by the very agency problems equity-based compensation attempts to alleviate). See also generally Lucian A. Bebchuk and Jesse M. Fried, *Pay without Performance: Overview of the Issues*, 30 J Corp L 647 (2005) (arguing that flawed compensation agreements are widespread and problematic and suggesting reforms for greater transparency).

wealthy individuals. In addition, VC compensation is relatively standardized, at least in its basic structure, which makes it possible to compare terms across multiple funds. This is harder to do when studying executive compensation in other industries. VC performance is also measurable and thus amenable to cross-fund comparison in a way that performance of executives of other firms is often not.

I use a hand-collected dataset of venture capital partnership agreements to analyze the structure and predictors of VC compensation. I supplement the study of agreements by interviews with numerous industry participants—venture capitalists, managers of institutions that invest in venture funds, attorneys, and private investors—and identify several new findings. First, the compensation of venture capitalists is comprised not only of management fee and carried interest, the two elements commonly identified, but includes a third element. This additional element is the value of the interest-free loan that VCs receive from limited partners. The amount and term of this loan are specified through distribution rules determining when VCs receive their share of profits. A shift from the most popular distribution rule to the second-most popular rule can affect VC compensation as much as or more than common variations in management fee or carry percentage. Because of this interest-free loan, VCs almost always capture a higher fraction of funds' profits—sometimes a much higher fraction—than the nominal carry percentage, even before we consider the management fee.

Second, VC compensation is not only more complex than is often believed, but it is also more opaque and manipulable than it could have been. The impact of opaqueness on total pay is ambiguous. More opaque management-fee provisions predict *lower* total compensation, which is not consistent with the view that complexity is used to camouflage high pay. However, the interest-free loan is both opaque and highly valuable.

Third, VC compensation is substantially less performance-based than commonly believed. For vintage years 1986 through 1997 (the most recent years for which funds have been fully liquidated), an average VC received about half of his compensation from the management fee, which (depending on its precise form) is either completely or largely unaffected by fund performance. On average, a 1 percent increase in the net present value (NPV) of a fund's returns translated into a 0.47 percent increase in VC compensation. This pay-performance elasticity is similar to that of CEOs of public companies during the same years and is lower than that of CEOs of S&P 500 financial firms.

Fourth, common proxies for VC quality (past performance and capital under management) positively predict more transparent elements of VC compensation (management fee and carry) but do not predict the levels of opaque compensation (interest-free loan as specified in the distribution rules).

Fifth, fund size (a strong predictor of VC take-home pay) is strongly and positively predicted by VC long-term past performance and prior fund sizes; however, changes in recent performance do not predict changes in the sizes of new funds. Finally, some management-fee provisions have the effect of smoothing VC incomes over time.

These findings suggest that direct investor participation in the setting of managerial pay may not radically change existing patterns of executive compensation in public companies. Even though VC compensation is not negotiated by uninformed, uninterested, or disloyal individuals (as directors of public companies are sometimes described), VC compensation is still more opaque and complex than it could have been, is higher than a calculation based on the visible components (management fee and carry) would suggest, and has a sensitivity to performance similar to that of public company executives. On the other hand, in venture funds, unlike in public corporations, much of the contractual complexity is not used to increase overall compensation.

This Article proceeds as follows. Part I describes the limited prior literature, my data, and the variables I use. Part II describes the three elements of VC compensation and presents basic descriptive statistics. Part III analyzes predictors of VC compensation. Part IV studies the relationship between fund size, performance, and VC compensation. In Part V, I investigate the pay-performance sensitivity of VC compensation. Part VI analyzes the relationship between compensation complexity and income smoothing.

I. LITERATURE REVIEW, DATA, AND VARIABLES

A. Literature Review

To my knowledge, there are only two other academic studies of VC compensation. The first is a 1999 study by Paul Gompers and Josh Lerner.[3] They study a large sample of relatively old agreements, dated from 1978 to 1992, most of them from funds raised before 1987.[4] They find some variation in carry but a huge concentration at 20 percent.[5] They also find only modest differences in management fees across venture firms.[6] However, as I discuss in Part II, they appear to have miscoded management-fee rules, which use a managed-capital base.[7]

3 Paul Gompers and Josh Lerner, *An Analysis of Compensation in the U.S. Venture Capital Partnership*, 51 J Fin Econ 3 (1999).

4 See id at 27–28.

5 Id at 14.

6 Id at 21–22.

7 See note 17.

Other scholars have generally accepted the stylized fact that VC compensation, relative to fund size, rarely varies from a standard level.[8]

The second is a contemporaneous study by Andew Metrick and Ayako Yasuda, who study both VC and leveraged buyout funds from 1992 to 2006.[9] They find more variation in management-fee structures than Gompers and Lerner,[10] and also find a huge concentration in carry percentage at 20 percent.[11] Further, they report that about 40 percent of the VC funds in their sample use a "hurdle rate," a rate of return that must be met before carry is earned.[12] Hurdle rates are common for leveraged buyout funds. But I have *never* found them in my sample, Gompers and Lerner do not mention them, and my interviewees confirmed that in their experience, VC funds very rarely use hurdle rates. Indeed, the leading venture capital treatise that addresses fund partnership agreements does not even mention hurdle rates in the context of VC compensation.[13] The absence of hurdle rates from venture capital partnership agreements has attracted academic attention before.[14] This casts doubt on whether Metrick and Yasuda's sample is in fact restricted to venture capital firms, as this term is conventionally understood.

Neither study discusses distribution rules, which emerge in my study as a third central source of VC compensation. I am aware of only two brief discussions of distribution rules by academics, both of which appear in business school teaching cases.[15]

B. Data

I use three data sources. My main dataset is hand-collected and consists of partnership agreements of sixty-eight venture capital funds, raised

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8 See, for example, Steven N. Kaplan and Antoinette Schoar, *Private Equity Performance: Returns, Persistence, and Capital Flows*, 60 J Fin 1791, 1794 (2005) (pointing to Gompers and Lerner's finding that VC compensation is largely uniform, and finding it "puzzling that [persistently high] returns to superior skill [of some VCs] are not appropriated by the [general partners] through higher fees and larger funds").

9 Andrew Metrick and Ayako Yasuda, *The Economics of Private Equity Funds* *4 (Working Paper, Swedish Institute for Financial Research Conference on The Economics of the Private Equity Market, Sept 2008), online at http://ssrn.com/abstract=996334 (visited Jan 11, 2009).

10 See id at 15–16.

11 Id at 10.

12 Id at 12.

13 See generally Michael J. Halloran, Lee F. Benton, and Jesse Robert Lovejoy, 1 *Venture Capital and Public Offering Negotiation* § 15 (Aspen Law and Business 3d ed 1996 & Supp 2008) (describing the typical structure of management fees and expenses of venture capital partnerships).

14 See generally Victor Fleischer, *The Missing Preferred Return*, 31 J Corp L 77 (2005) (pointing out that venture capital partnership agreements do not use hurdle rates, while buyout funds do, and discussing possible reasons for the difference).

15 See Steven Kaplan, Case Study, *Accel Partners VII* 2 (Chicago 1999), online at http://faculty.chicagogsb.edu/steven.kaplan/teaching/accel7.pdf (visited Jan 11, 2009); Josh Lerner, Case Study, *A Note on Private Equity Partnership Agreements* (Harvard 2000) (explaining the structure of private equity partnerships in the form of a business school case study).

by twenty-eight venture capital firms. All funds specialize exclusively in venture capital, and all are US-based stand-alone limited partnerships, rather than affiliates of other entities such as banks or corporations. All compensation data (carry, management fee, distribution rule) and other fund-specific contractual terms come from this dataset.

I obtain the data on fund-level non-contract-related characteristics (fund size, vintage, location, the number of successful and failed companies, and so on) from Thomson Financial's VentureXpert database.[16] I use only venture firms marked by VentureXpert as stand-alone limited partnerships and, from funds raised by those firms, I use only the funds marked as "venture funds." My results do not change when I also restrict the investment stage to "seed" and "early stage."

My third source is annual data on venture fund investments, distributions, and profits provided to me by Sand Hill Econometrics. This is a high-quality proprietary database containing comprehensive private-equity data on subjects unavailable from VentureXpert and other standard commercial databases.

An important data limitation: I have data on fund sizes and on the outcomes of portfolio investments (how many investments the fund made and how many resulted in an IPO, a sale, or failure), but no data on the returns of my sample funds. Thus, I have respectable proxies for VC quality but no direct measure of performance.

Table 1 reports descriptive statistics. The funds in my sample were raised between 1983 and 2005, with the mean vintage year 1997. Funds and firms are diverse in size, age, and performance.

Limited partnership agreements are confidential documents, collected principally from large institutional investors (limited partners, or LPs) and VCs. I therefore may face a selection bias. One possibility is that I oversample good (or bad) funds and VCs. This, however, does not seem to be a significant problem. First, the funds in my sample are decent representatives of funds raised in their vintage years. In Column (2) of Table 1, I present basic mean characteristics of funds in my sample, and in Column (3), mean characteristics of all venture capital funds in the VentureXpert database raised after 1983 (vintage year is restricted to match the funds in my sample). The funds in my sample are somewhat better than average (they are larger and have a higher portion of successful companies in their portfolios), but for most variables, the differences are not large.

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16 VentureXpert is a large commercial database containing comprehensive information on venture capital firms and funds, executives, and companies backed by private equity. It is widely used in academic research in finance, law, and accounting. See, for example, Gompers and Lerner, 51 J Fin Econ at 14 (cited in note 3).

Second, although the funds in my sample are slightly better than average, there is no reason to believe that the selection was driven by the fund characteristics that I study in this Article. Most of my agreements came from large institutional investors. Thus, my funds are better than the average because they came from LPs who invest in better funds, not because VCs with certain compensation arrangements were more likely to give me their agreements. Still, to the extent that (1) the funds in my sample are above average, and (2) past performance predicts higher compensation, I may oversample funds with above-mean compensation.

C. Variables

In my analysis, I use the following variables. All dollar-based variables are measured in 2008 dollars.

Total dollars raised by the VC before this fund. This variable represents the sum of fund sizes for all prior funds raised by the VC (including side funds), as reported in VentureXpert. In regressions, this variable is normalized as follows: I first calculate, for each stand-alone venture firm in VentureXpert, the total dollars raised prior to that vintage year. I then calculate the number of standard deviations by which each of my funds differs from the mean for all funds raised in that year.

Above-median total dollars raised by the VC before this fund. This is a dummy variable, equal to 1 if this measure is above median among the funds in my sample and equal to 0 otherwise. It is based on the normalized values of total dollars raised by the VC before this fund.

VC age when fund is raised. This variable is the age of a venture firm in the year of fundraising.

Fund vintage year. This variable is the year when a fund is raised.

Fund size. This variable is the total committed capital of each venture fund, specified in the partnership agreement and cross-checked in VentureXpert. In regressions with fund size as an independent variable, I use normalized fund size—the number of standard deviations by which the size of each of my funds differs from an average fund raised in the same year, as reported in VentureXpert.

Lagged fund size. This variable represents the fund size of the VC's immediately preceding fund. It is normalized as described above in regressions.

Fund number. This variable is the chronological number of a fund raised by a given venture firm, specified in the partnership agreement. In regressions, I use normalized fund number—the number of standard deviations between the chronological number of each of my funds and the average fund number for all funds raised in the same year, as reported in VentureXpert.

Management fee. This variable is the net present value of the cumulative management fee over an assumed eleven-year fund life, as a

percentage of committed capital. Different funds calculate fees according to different formulas; to make fees comparable across funds, I convert all of them to the common denominator of committed capital (that is, fund size).

Carry. This variable is the percent of the fund's profits payable to VCs as risky compensation.

Distribution coefficient. This variable is the ratio of carry that a VC would receive according to the distribution rule specified in a partnership agreement over carry that a VC would receive under the most investor-friendly distribution rule.

Sold/Total. This ratio is the number of portfolio companies that a venture firm "sold" (designated by VentureXpert as "IPO," "acquisition," "buyout," or "merger") in all prior funds to the total number of portfolio companies that a VC funded in all prior funds. In regressions, it is normalized as the number of standard deviations between the "sold/total" value for each of my funds and the average "sold/total" value for all VC funds formed in the same year, from VentureXpert.

IPO/Total. This ratio is the number of companies that a venture firm took public (designated by VentureXpert as "IPO") in all prior funds to the total number of portfolio companies that a VC funded in all prior funds. In regressions, it is normalized as the number of standard deviations between the "IPO/total" value for each of my funds and the average "IPO/total" values for all VC funds formed in the same year, from VentureXpert.

Failed/Total. This ratio is the number of failed companies in a venture firm portfolio (designated by VentureXpert as "bankrupt" under any chapter or "defunct") in all prior funds to the total number of portfolio companies that a VC funded in all prior funds. In regressions, it is normalized as the number of standard deviations between the "failed/total" value for each of my funds and the average "failed/total" value for all VC funds formed in the same year, from VentureXpert.

Above-median sold/total ratio, IPO/total ratio, and failed/total ratio. These dummy variables equal 1 if the ratio is above the median for all funds in my sample and equal 0 otherwise. They are based on normalized sold/total, IPO/total, and failed/total values.

Base of management fee is committed capital. This dummy variable equals 1 if management fee is calculated on the basis of committed capital and equals 0 otherwise.

Classic management fee. This dummy variable equals 1 if management fee is a constant percentage of committed capital over the fund's life and equals 0 otherwise.

Formula for management-fee calculation changes in midstream. This dummy variable equals 1 if formula for management-fee calculation changes at least once in the fund's "main" years, the first ten years.

Rule 1 through Rule 8. These dummy variables equal 1 if management fee is calculated according to the formula with the corresponding rule number and equal 0 otherwise. See Table 2 for rules.

Fundraising cycle of four to six years. This dummy variable equals 1 if in the past a VC firm raised new funds each four to six years (on average) and equals 0 otherwise.

Midstream-peaking management fee. This dummy variable equals 1 when the fund's management fee peaks in middle years of fund's life and equals 0 otherwise.

II. THE THREE ELEMENTS OF VC COMPENSATION

A. Management Fee

Investors usually pay management fees every quarter. These payments are typically added to the investor's obligation to contribute committed capital.

1. Types of Management-fee Formulas.

In the twenty-eight families of funds in my sample, there are nine different formulas for calculating the management fee. Within each venture firm, these formulas are "sticky"—they sometimes change across different funds raised by the same firm, but most of the variation is between different firms, not between different funds raised by the same firm.

Each formula contains two basic elements: (1) the base, and (2) the portion of the base paid annually to the VC. The base is either committed capital, cost basis of invested capital ("managed capital"), or some combination thereof. It is very unusual to base the management fee on the fair market value of portfolio companies managed by the fund, and no such arrangements were found in my sample.[17] The base can be constant or vary over time, and the percent applied to the base also can be either constant or vary over time. I refer to the management fee as "riskless" or "nonrisky" compensation because even if it is based on managed capital and thus depends on the VC firm's investment decisions, it does not directly depend on the profitability of these investments.

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[17] One top venture capital attorney put it this way in email correspondence: "Unlike hedge funds you will never see the management fee based on [the asset value] of the [venture] fund. One of the many reasons for this is that the assets held by these funds are illiquid and difficult to value." Email from anonymous attorney to Kate Litvak (Jan 15, 2004). Gompers and Lerner treat the managed-capital base as equal to the fair market value of the fund's investments, rather than their cost basis. See Gompers and Lerner, *An Analysis of Compensation in the U.S. Venture Capital Partnership*, 51 J Fin Econ 3, 42 (1999) (cited in note 3). This is likely to be a miscoding, although I cannot be sure because I do not have their agreements.

a) Classic flat fee: constant percentage of committed capital. The VC receives a constant percentage of committed capital (that is, the capital that investors promised to contribute to the fund) on a quarterly basis. Since neither the percentage nor the base changes over the fund's life, this arrangement amounts to a flat fee, payable over time unconditionally. Such a flat fee could have been specified in the agreement as a dollar amount, rather than expressed indirectly through a formula, but this was not the case in the agreements I reviewed, and my interviewees confirm that this almost never happens.

b) Flexible flat fee: time-varying percentage of committed capital. This fee is calculated as a percentage of committed capital, but the percentage changes according to a prespecified formula over time. As with the classic formula, the management fee here is entirely determined at the outset and thus has the same effect on VC incentives as a flat wage would have. The only difference between the classic and the flexible flat fee is the distribution of a preset fee over time. Since investors are sophisticated, it is hard to see the time-varying fee percentage as fee obfuscation, but it might serve as a form of income smoothing. I assess this possibility in Part IV.

c) Fee based entirely on managed capital. "Managed capital," measured as the cost basis of undistributed and unliquidated securities, is sometimes used as a partial basis for management fee but rarely as the sole basis (only one of my funds does so). Unlike committed capital, which normally remains constant over time, managed capital varies through a fund's life: it is low at first, before the fund invests in portfolio companies; increases as the fund makes investments; and declines again as VCs distribute proceeds to investors. Thus, in funds using a managed-capital base, management fee peaks in the middle years, unless the percentage applied to the base is adjusted correspondingly (say, reduced in middle years to flatten the fee over time), which does not occur in my sample and, based on my interviews, virtually never happens.[18]

The use of the managed-capital fee arrangement seems odd given the availability of committed capital–based fees. If the purpose is to load a larger portion of the overall riskless compensation onto certain years, this can be done more precisely through the flexible flat fee. Moreover, the use of managed capital carries real costs. First, the exact size of managed capital is not known at the time of fundraising, and thus the fee is at least somewhat uncertain. Second, when VCs receive a fee based on invested and undistributed fund assets, they have an incentive to speed up investment and delay distributions of these assets to investors. Most agreements in my sample attempt to limit the

18 See Part VI.B.

VC's discretion as to the size of managed capital, both during the fund's investment period (by requiring that all called capital be promptly invested and by setting limits on the amounts of capital callable per year[19]) and in the distributions period (by requiring prompt distributions of all proceeds from sales of portfolio companies). However, VCs can still manipulate the management fee through suboptimally accelerated investment schedules within the limits set by the partnership agreement, and they can preserve their management fee by delaying the sale of portfolio companies.[20]

In my interviews, industry insiders suggested that managed capital basis and flexible flat fee are attractive because it is "unfair" to pay VCs the same compensation in middle years of a fund's life, which are the most labor-intensive stage, as in early years when most of the fund's capital is not yet called, or in later years when most of the fund's investments have been liquidated. This makes no sense. First, the management fee is effectively a wage paid to VCs for their labor. It is not clear why this wage should fluctuate with the amount of work that VCs perform in each stage. Most traditional companies pay salaried employees the same wage in busy and nonbusy times, and this is not normally viewed as "unfair." Second, it is hard to see why one manner in which sophisticated parties allocate a fixed number of dollars over time is "fairer" than another.

d) Fee with a switch from committed to managed capital. Here, early-year fees are set as a percent of committed capital, while later-year fees are set as a percent of managed capital. Because managed capital declines in later years, this formula usually produces a gradual reduction in the management fee. As with a fee based entirely on managed capital, this arrangement produces a less certain (and less precisely calibrated, if the goal is income smoothing) fee schedule than a flexible flat fee, and it creates incentives for VCs to manipulate the timing of distributions.

e) Absolute dollar amount. None of my agreements specifies a dollar amount as a management fee; by all indications, such arrangements are exceedingly rare. This may be cosmetic—a fee of 0.5 percent of committed capital per quarter on a $500 million fund may sound

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19 For more details, see Kate Litvak, *Firm Governance As a Determinant of Capital Lock-in* *8–9 (University of Texas Law and Economics Research Paper No 95, Mar 2007), online at http://ssrn.com/abstract=915004 (visited Jan 11, 2009).

20 One can imagine an explanation in which the manipulation incentives provided by a managed-capital base offset the VC's other manipulation incentives, including those provided by the desire to show a high internal rate of return for the current fund when raising the next fund and those provided by distribution rules. But any offset would be rough at best, and none of my interviewees suggested this explanation.

better to investors than a fee of $100 million, paid $2.5 million per quarter. But one doubts that sophisticated investors are fooled. In contrast, the riskless compensation paid to corporate managers is routinely expressed upfront in dollars. So far, no research has explained this difference in practices.

One could object that the management fee is different from executive compensation in that the management fee is partly used to cover fund expenses.[21] However, none of my agreements pegs the management fee to the actual fund expenses that the fee covers. Moreover, nearly all of my agreements specify expenses that limited partners have to pay in addition to the management fee (for example, bankers' and accountants' fees in connection with sales of portfolio companies, reimbursement for litigation or regulatory expenses, the fund's origination and liquidation expenses, and so forth). The expenses covered by the management fee are usually predictable and not volatile, consisting mostly of fund employees' salaries, travel, and entertainment; office rental costs; costs of preparing reports to investors; and insurance premiums. Since venture funds already have a well-specified procedure for reimbursement of actual expenses, they could have moved all reimbursements out of the management fee and turned the management fee into a straightforward salary provision, expressed in dollars. This has not happened.

2. Descriptive statistics.

Management fee formulas and their frequency of use are summarized in Table 2, Panel A. The most popular formula, used by eight firms and twenty-one funds, is the "classic flat fee," followed by the "flexible flat fee." Other methods (in order of decreasing popularity) are: switch from committed-capital to managed-capital base in midstream, accompanied (not necessarily simultaneously) by reduction over time in the applicable percent; a constant percent applied to a base that switches from committed to managed capital in midstream; a percentage that increases in the first several years and declines thereafter, applied first to committed-capital base and later to managed-capital base; switch from committed to managed capital with an increasing percentage; a constant percentage applied to a decreasing

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[21] See, for example, David Toll, *Private Equity Partnership Terms and Conditions* 38 (Dow Jones 3d ed 2003) (noting that, in the private equity context, "[t]he rationale [for switching from committed capital to managed capital as a basis] is that [the VC] will incur greater expenses during the investment period, when the team is putting the money to work. Subsequently . . . [the VC's] expenses related to this fund can be tied to the specific companies remaining in the portfolio, and should therefore be reimbursed accordingly").

fraction of committed capital; and an increasing and then declining percentage applied to a managed-capital base.

The variety of formulas used understates the variety of management-fee arrangements because several funds may use the same formula but put different numbers into that formula. For example, among the twenty-one funds that used the classic formula (flat percentage of committed capital), eight funds used 2 percent, ten used 2.5 percent, one used 2.25 percent, and two used a fee lower than 2 percent.

It should be apparent that the conventional wisdom that most venture firms charge a management fee of 2 percent of committed capital is simply wrong.

To estimate the NPV of management fees under different arrangements, I make the following assumptions: (1) the discount factor is 7 percent, to reflect the low-risk nature of fee-based compensation; (2) the fund life is eleven years (a one-year extension of the standard ten-year life); (3) for funds where the fee is based on managed capital, I assume the schedule of investments and distributions presented in the Appendix. This schedule reflects the time that VCs need to invest the fund's capital (hence low percentages in early years) and the distributions that they make in later years (hence low percentages in late years). It is based on investments and distributions data for an average fund raised in 1992, provided to me by Sand Hill Econometrics; the results are similar if I use a typical fund schedule for a different year.[22] To compare management fees across funds that use different formulas and are of different sizes, I convert each fund's NPV of the management fee into a percentage of the fund's committed capital, regardless of what base a fund's agreement actually used.

As Table 2, Panel A indicates, the NPV of management fees varies widely across funds. The sixty-eight funds in my sample use twenty-nine different values of the management fee, ranging from 3.32 percent to 20.15 percent of committed capital, with a mean of 14.14 percent and a median of 14.30 percent. In Figure A, I present the NPV of management fees for all funds in my sample, sorted in the ascending order of the fee.

From the Appendix, the managed-capital base is always less, and often much less, than committed capital. Thus, unless the applicable percentage is higher for a fee with a managed-capital base, the managed-capital base will produce a lower overall NPV. If a VC is willing to accept a lower than usual management fee, but is concerned that reducing the most salient feature of the fee (applicable percentage) will send a bad signal to the market, the use of the managed-capital basis might provide a solution. There is some evidence of such "win-

22 The model year has to be earlier than 1997 to ensure that all of the fund's activity is included.

dow dressing" use of the managed-capital base: in my sample, a midstream switch from committed to managed capital is never accompanied by the compensating increase in the applicable percentage—on the contrary, it is usually accompanied by a reduction in the applicable percentage. This reduction would presumably look more dramatic if the fund continued to use committed capital. Generally, the funds in my sample that use the classic flat fee throughout the fund's life apply the mean percentage of 2.25 percent to committed capital. For the funds that apply a constant percentage to the base that switches from committed to managed capital, the mean applicable percentage is 1.88 percent. It does not look like the funds are compensating for the reduction in base by increases in the applicable percentage.

B. Carried Interest

Carried interest is the second principal component of VC compensation. It is normally measured as a flat percentage of a fund's profits on invested capital. The carry provisions are substantially simpler than provisions outlining management fees. Usually, carried interest does not even occupy a separate section in partnership agreements and the carry percentage is not directly stated; instead, it must be inferred from reading the distribution rules, which specify how much VCs receive at each distribution.

One could easily construct a more complex carry arrangement, where the VC's percentage of profits would change depending on fund profitability or other conditions. For example, in many leveraged buyout funds, the private equity firm earns carry only on returns above a hurdle rate, such as 8 percent.[23] However, as best I have been able to determine, hurdle rates are virtually never found in venture fund agreements, and none of my funds use them.

In the great majority of funds, the carry percentage is computed without regard to the separate payment of the management fee. I assume below that carry percentage is computed in this manner. Again, one can imagine more complex arrangements. For example, at least one VC firm in my sample subtracts management fee from investment return in computing the profit on which it earns carry.

The overall result is surprising: in VC compensation, the riskless component is complex and potentially manipulable while the risky component is—at first blush—simple and straightforward. In many other industries, the picture is the opposite: riskless compensation is straightforward (for example, wage), while risky compensation is com-

23 Fleischer, 31 J Corp L 77, 78 (cited in note 14).

plex (for example, bonus and stock option plans with complicated formulas, or sales commissions that increase when certain benchmarks are met). But as discussed in the next Part, the apparent simplicity of carry is deceiving.

In addition to being apparently simpler contractually, carry varies less across funds and venture firms. Among funds in my sample, carry ranges from 12.5 percent of profits to 30 percent, with the mean of 22.3 percent and median of 20 percent. Figure B provides a summary. Here, funds are sorted in the ascending order of the carry. Still, I find far more variation than the other available studies. Only 59 percent of the funds in my sample (forty of sixty-eight) use the "classic" 20 percent carry. This compares to the 95 percent reported by Metrick and Yasuda,[24] and the 81 percent reported by Gompers and Lerner.[25] My results are likely different from those reported by Gompers and Lerner because I mostly have newer funds in my sample; the difference from Metrick and Yasuda could result either from some of their funds not being true VC funds (which could explain their puzzling finding that 40 percent of VC funds use a hurdle rate), or from sample selection bias, since they have funds from only a single investor.[26]

C. Distribution Rule

1. General principles.

While carry is simple on the surface, complexity is lurking in the form of the distribution rules that determine when carry is paid. Each fund invests in multiple projects; projects are liquidated at different times throughout the fund's life; and the proceeds are distributed to investors (usually) promptly after profits are realized. The issue then arises: When should VCs receive their share of profits? As soon as investors get theirs? At the end of a fund's life, based on the cumulative performance across all projects? Or is there an intermediate solution?

This need not be an important question. In a Modigliani-Miller world,[27] the timing of dividend payouts (conceptually equivalent to distributions) is irrelevant to firm value. The venture fund can distri-

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24 See Metrick and Yasuda, *The Economics of Private Equity Funds* at *10 (cited in note 9).

25 Gompers and Lerner, 51 J Fin Econ at 14 (cited in note 3).

26 For example, if their investor chooses not to invest in funds with a carry percentage greater than 20 percent, that could explain why only one of the ninety-four VC funds in their sample has a carry percentage above 20 percent. See Metrick and Yasuda, *The Economics of Private Equity Funds* at *10 (cited in note 9).

27 See generally Franco Modigliani and Merton H. Miller, *The Cost of Capital, Corporation Finance, and the Theory of Investment*, 48 Am Econ Rev 261 (1958) (presenting the theory that in an efficient market, and in the absence of information asymmetries and costs associated with taxes and bankruptcy, the firm's value is not related to the means by which it is financed).

bute the VC's share of profits today, or if distribution is delayed, the VC can borrow against his share of undistributed profits. In a decently functioning credit market, the two arrangements could be structured to yield the same expected value for VCs. The lower present value of a slower distribution pattern could be offset through a change in the carry percentage, or by charging (crediting) the VC with interest on an early (late) distribution.

However, once information and incentive problems, transaction costs, and taxes are taken into account, the answer changes. In interviews, industry insiders told me that they considered timing of distributions to be important. VCs find—or at least claim—that borrowing from outside lenders against future income is prohibitively expensive, because they cannot credibly convey to lenders information about the quality of their funds' portfolios. As a result, VCs instead borrow from their own LPs through early distributions, and they care deeply about the timing of distributions. In this way, early distributions of carry can be used to smooth VCs' incomes.

The timing of distributions to VCs involves compromises regarding the costs of outside borrowing, the credit risk faced by investors if they allow early distributions (which might have to be repaid back into the fund), and the need to create proper incentives for VCs, who control the timing of distribution events. Thus, distribution schedules would likely be complex even if VCs paid a market rate of interest on the loan that is implicit in an early distribution that is later repaid. However, all partnership agreements in my sample provide that no fund participant pays any interest to any other participant for anything.[28] Why not? After all, interest rates, paid by the VC to the fund (or the other way around), could compensate for the credit risk borne by investors and reduce VCs' perverse incentives to manipulate schedules of sales.

One explanation that emerged from my conversations with practitioners is that VCs usually receive a net loan from investors as a result of the timing of distributions. VCs thus may be interested in preserving the current system, in which the magnitude of the loan is embedded in incomprehensible clauses about distribution timing, to keep the value of the interest-free loan at least partly hidden from investors. We may question whether sophisticated institutions can be systematically deceived in such a manner, but this speculation is not entirely implausible, given that no prior academic or practitioner article has attempted to place a dollar value on specific distribution rules.

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[28] A rare exception is direct traditional borrowing by the fund from an investor or a VC. Interest on the borrowed funds, however, is a different issue from interest paid by VCs on, say, early overpayment of profits.

In my interviews, investors, VCs, and VC lawyers were aware of the existence of distribution rules, but none had tried to quantify the relative value of different rules, and investors were surprised when advised about the magnitudes I report below. One might also note that a major investor's coding of compensation terms, which forms the basis for the Metrick and Yasuda study,[29] apparently omits distribution rules entirely.

Another notable feature is that the distribution rule is typically independent of fund performance and broader economic conditions. While a fund agreement could provide for a switch from one distribution to another in the midstream of a fund's life (as is common for the management fee), this has not happened as best I can tell. Likewise, distribution rules themselves could be linked to fund performance, but they are not: even the (rare) rule requiring the VC to reach a certain milestone to start receiving distributions[30] does not impose follow-up requirements; once the milestone is met, the VC receives full carry at each distribution, regardless of subsequent performance.

2. Types of distribution methods.

In this Part, I briefly describe the distribution methods found in my agreements. One can think of many other arrangements, and the practitioners' literature contains other creative proposals.[31] I list the arrangements in increasing order of VC-friendliness.[32]

a) Escrow, all interest to fund. As profits are distributed to investors throughout the fund's life, the VC's share of profits goes to an escrow account. The interest on that account is allocated to limited partners in proportion to their capital contributions. When the fund is liquidated, the VC receives the principal amount from that account. Until that time, the VC has, in effect, made an interest-free loan to investors. This method eliminates credit risk on both sides as well as the risk that the VC will manipulate the distribution schedule. However, it does not allow VCs to smooth their incomes over time.

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29 See Metrick and Yasuda, *The Economics of Private Equity Funds* at *4 (cited in note 9).

30 See discussion in Part II.C.2.

31 See generally, for example, Jonathan Axelrad and Eric Wright, *Distribution Provisions in Venture Capital Fund Agreements*, Venture Capital Rev (Nov 1997), reprinted in Memorandum from Fund Services Group, Wilson Sonsini Goodrich & Rosati, to Private Equity Fund Clients (Aug 5, 2001), online at http://www.wsgr.com/PDFSearch/1363214.pdf (visited Jan 11, 2009).

32 For a few funds in my sample, VCs were required to repay excess carry net of the tax that they already paid on it. One agreement went further and stated that VCs do not have to return the amount of taxes paid but have to return the amount of future tax benefits from taking the loss. I ignore this complication in the discussion below and in the regressions. If included in the analysis, these net-of-tax provisions would further reinforce my main claim—that distribution rules significantly affect and usually increase the NPV of the carry that VCs actually get—because in most cases, VCs get to keep both the tax they paid and the future tax benefits of any loss.

b) Return all capital contributions first ("Return First"). The VC receives no distributions until investors get distributions equal to their capital contributions. Once investors are paid, the VC receives carry on amounts already distributed to investors and then receives his share of profits at each subsequent distribution.

This method eliminates credit risk: since portfolio companies are corporations with limited liability, the most that the fund can lose is the amount it invested into those companies.[33] Thus, the VC will never receive more than his share of the fund's profits and will not have to repay anything. The method, however, misaligns VC incentives: since VCs are not compensated for the delay in distributing profits, they may accelerate distributions to accelerate payouts to themselves. It also limits opportunities for income smoothing.

c) One hundred twenty-five percent ceiling, 120 percent ceiling, and so forth ("Percent Ceiling"). The VC receives his share of profits only if the estimated net asset value of the fund, after the distribution, is more than 125 percent (120 percent, and so forth) of the cost basis of the fund's securities. The undistributed portion of the VC's share of profits is paid when the fund liquidates; the interest earned on the VC's unpaid carry is allocated to limited partners pro rata. This method reduces credit risk by leaving a part of the VC's carry in the fund until liquidation and reduces incentives to sell the fund's assets too early. The lower the ceiling, the more VC-friendly the rule. The ceilings used by the funds in my sample range from 100 percent to 125 percent.

d) Payback with no interest note ("Payback"). The VC receives a prespecified percent (equal to carry) of each distribution. Because the VC is entitled only to a share of profits but not to a share of repayments of invested capital, he must simultaneously contribute to the fund an amount equal to his share of repayment of capital. For example, assuming 20 percent carry, if the fund invests $100 in a company and receives $150 back, the VC would get 20 percent of $150 ($30) and would have to repay 20 percent of $100 ($20). The agreements in my sample that use this method do so only for distributions of securities, not cash. Most allow the repayment to be made through a non-interest-bearing note, secured by the VC's interest in the fund, and payable at liquidation. That is, the VC is systematically overpaid throughout the fund's life and returns the overpayment at liquidation without interest. The VCs, in effect, have the option to purchase the securities from the fund in exchange for a zero-interest IOU.[34]

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33 This assumes that the risk of subsequent securities litigation against the fund or the VC (who will be indemnified by the fund) or other unusual events is low enough to be ignored.

34 Partnership agreements typically allow VCs to opt out of distributions to themselves if they so wish. If VCs think that distributed securities are overpriced, they can simply refuse to

3. Popularity of distribution methods.

Table 3 summarizes the frequency with which VC funds in my sample use different distribution methods. The most popular is the Return First method, followed by the 100 Percent Ceiling, 120 Percent Ceiling, and Payback methods.

Overall, venture firms use a variety of distribution arrangements. Many firms use different arrangements for cash and securities distributions. A number use the highly VC-friendly Payback approach, but only for securities distributions, not cash distributions.

4. The impact of distribution methods on VC compensation.

This Part contains a brief, nontechnical summary of the procedure I use to estimate the value of distribution rules and their effect on total VC compensation.[35]

To estimate the value of the interest-free loan created by the distribution rules, for a fund with an assumed eleven-year life, I need to estimate: the timing and amount of capital calls, the timing and amount of distributions to investors, overall fund profitability, and so forth. I do so using data by fund vintage year provided to me by Sand Hill Econometrics for 1987 through 2006.[36] For each of the eight distribution rules found in my agreements, I create an algorithm formalizing how the rule applies to these distributions.[37] I next calculate the NPV of

take securities at that distribution. If VCs refuse a distribution, they receive a credit in their capital account that will eventually be paid out of the proceeds from the sale of other companies (albeit without interest).

35 For a full description, contact the author for a technical appendix.

36 Because full information on still-active funds is not yet available, I use average investment and distribution schedules from a pre-bubble vintage year (1992), provided by Sand Hill Econometrics, to predict expected distributions for funds raised after 1996. Thus, for a fund raised in 1998, I have data through 2006 and need to estimate year 10 and year 11. I use an average 1992 fund to establish the trend (percent change in distributions between year 9, year 10, and year 11). I then use that trend to extrapolate year 10 and year 11 for my 1998 funds on the basis of real data for year 9. In regressions that use distribution rules as variables, I limit the sample to funds raised in 1997 or before, to limit the potential impact of relying on extrapolated data.

37 For example, for the Return First rule, the algorithm is as follows: For each month of the fund's existence, examine the fund's distributions to investors and the amount that investors contributed to the fund to date; if the former is lower than the latter, VCs get zero in that month; if the former is higher than the latter, VCs gets the carry percent of the difference between the former and the latter. Sum the undiscounted payments to VCs in each month of the fund's existence through the end of year eleven. Calculate "carry under the agreement"—the difference between the total undiscounted fund return and the total undiscounted investor contributions, multiplied by the applicable carry percentage. If the total undiscounted payment to the VC at the end of year 11 is higher/lower than the carry under the agreement, the overpaid party transfers the amount of overpayment to the other party without interest at the end of year eleven. This amount is called "clawback." Using a 10 percent discount rate, calculate the net present value of all payments to investors and VCs, including payments in midstream and the clawback. The sum of all discounted payments to (by) VCs is the measure of the NPV of carry under the Return First distribution rule.

carry payouts for each combination of vintage year (from 1987 to 2005), carry percentage, and distribution rule found in my agreements. I compute the present value of all payments using a 10 percent discount rate, which is meant to be a reasonable average rate over my sample period for risky, performance-based cash flows.

Table 4, Panel A reports results for a hypothetical $100 million fund with a 20 percent carry and raised in different years from 1987 through 1996, which experiences average results (timing and amount of investments and distributions) for all funds raised in that year. The impact of distribution rule on the NPV of the VC's return is striking. For example, for an average fund raised in 1993, which turned out to be a highly profitable year, the NPV of carry under the most popular distribution method, Return First, is $27.43 million. Meanwhile, the Payback rule would yield $34.56 million to the VC. That is, VCs can increase their risky compensation by about 25 percent by switching to a more favorable distribution rule. In a less profitable year (say, vintage year 1988), the switch from the Return First rule to the Payback rule increases the NPV of the VC's risky compensation by 45 percent, from $17.47 million to $25.43 million. A more moderate change, from Return First to 100 Percent Ceiling, would increase NPV for an average 1987 fund from $15.21 million to $17.66 million. In a very low-profit year (1996), the Return First method gives the VC $8.19 million, while the Payback method yields $14.72 million, an increase of 80 percent (albeit a modest increase in absolute dollar values).

Another way to assess the importance of distribution rules is to ask how much, in NPV terms, investors take home vis-à-vis VCs under each arrangement. Table 4, Panel B contains the results for an average fund in a low-profit year (vintage year 1997), a medium-profit year (vintage year 1995), and a high-profit year (vintage year 1993). This Table separately presents results with and without management fees.

In the low-profit fund scenario, a $100 million fund generates a total return of $131 million over the fund's lifetime. Accounting for the time value of money, investors lose about $15 million under the Return First distribution rule and $22 million under the Payback rule. However, the VC earns carry because the fund is "profitable" under the standard definition in partnership agreements, which ignores the time value of money. Under the Return First (Payback) rule, carry plus the value of the interest-free loan results in the VC receiving $12.38 million ($19.56 million) in NPV as supposedly performance-based compensation, not counting management fees.

The medium-profit fund also shows a large difference in VC pay based on the distribution method. The fund generates total undiscounted returns of $254 million, and total NPV of the fund's investments, shared by the VC and investors, is $70 million. The NPV of the

VC's carry ranges from $10.80 million to $27.04 million, depending on the distribution rule. The VC thus earns between 15.38 percent and 38.50 percent of the fund's overall NPV before accounting for the management fee. If we add the management fee (assumed to be a flat 2.5 percent of committed capital), the VC receives from 42.07 percent to 65.19 percent of the fund's total NPV.

For the high-profit fund, the total undiscounted return (total NPV) is $327 million ($107.85 million). The NPV of the VC's carry ranges from $15.88 million to $34.56 million, or between 14.72 percent and 32.04 percent of total NPV, depending on the distribution rule. Including the management fee, the VC's share of total NPV is between 32.11 percent and 49.43 percent.

In short, Table 4 shows that the nominal carry—the carry listed in the partnership agreement—is often misleading. Depending on the distribution rule, fund profitability, and investment/distribution schedules, a 20 percent *nominal* carry can translate into a *real* risky compensation ranging from 15 percent to more than 100 percent of the fund's profits.

Next, I compare the differences in the NPV of the carry received by VCs across distribution regimes to the differences in NPV caused by variation in the other two principal elements of VC compensation—management fee and carry percentage. In Table 4, Panel C, I present the results for a $100 million fund that has profitability and investment/distribution schedules of an average medium-profit fund (average 1995 fund). I ask how much VC compensation is affected by (1) switching from one common management-fee rule to another (holding risky compensation constant); (2) switching from one common carry percentage to another (holding the distribution rule and the management fee constant); and (3) across three common distribution rules (holding the carry percentage and management fee constant). As before, I use a 7 percent annual discount rate for management fee and a 10 percent rate for carry. Small changes in the assumed rates do not change the results significantly.

An increase in management fee from a flat 2 percent to a flat 2.5 percent (a significant and heavily negotiated change) increases the NPV of the management fee by a factor of 1.25, or $3.75 million. An increase from a 20 percent carry to a 25 percent carry, assuming the most popular distribution rule (Return First), also a significant, negotiated change, increases the NPV of carry by a factor of 1.25, or $5.07 million. A shift from the Return First (most popular distribution rule) to the 100 Percent Ceiling (second-most popular rule) increases the NPV of carry by a factor of 1.14, or $2.78 million. Thus, the effect of a change in the distribution rule is of the same order as a change in the management fee or carry percentage. Moreover, a change from the most popular rule to the most pro-VC rule increases the NPV of

carry by a factor of 1.33, from $20.40 million to $27.04 million. For a high-profit (low-profit) fund, the dollars affected by the distribution rule will be higher (lower) than in the medium-profit scenario shown in Panel C, as will the relative importance of the distribution rule relative to management fee; the importance of distribution rule relative to carry percentage will be lower (higher).

III. PREDICTORS OF VC COMPENSATION

In this Part, I ask what factors predict each of the three components of VC compensation and the cumulative compensation.

A. Predictors of Total Management Fee

I first assess the overall relationship between VC quality and the management-fee level. Gompers and Lerner find no association.[38] In contrast, I find evidence that proxies for VC quality predict a higher management fee.

In Table 5, the dependent variable is NPV of the management fee, as a percentage of committed capital over eleven years of a fund's life. As proxies for VC quality, I use several measures of managed capital, all normalized: fund size, lagged fund size, and total dollars raised by the VC in all prior funds. I also use two measures of past performance: the sold/total and failed/total ratios. Other control variables include an indirect proxy for VC quality (fund number) and fund vintage year. All regressions have venture-firm random effects and vintage-year fixed effects, with robust standard errors. Regressions 1–4 use above-median sold/total and failed/total measures of VC past success; regression 5 switches to continuous measures.

There are several sources of evidence that past performance predicts management fee. First, funds raised by VCs with an above-median sold/total ratio have higher management fees. However, in regression 5, a continuous measure of sold/total ratio is insignificant. Second, the coefficient on above-median failed/total ratio is consistently negative, although not significant. In regression 5, the continuous failed/total ratio is negative and marginally significant. Third, normalized fund size is a significant or marginally significant predictor of a higher fee in regressions 1, 3, and 4. In regression 2, I include both current fund size and lagged fund size; both are positive, lagged fund size is separately marginally significant, and the two together are jointly significant ($F = 7.76, p = 0.02$).

38 See Gompers and Lerner, 51 J Fin Econ at 27 (cited in note 3).

B. Carried Interest

In Table 6, I test whether proxies for VC quality predict carry percentage. As for the management fee, there is evidence that the answer is yes. Thus, I not only find significant variation in carry percentage, in contrast to Gompers and Lerner and to Metrick and Yasuda, but the variation is sensible—better VCs use higher percentages.[39]

In Table 6, I use the same specifications as in Table 5. All regressions use venture-firm random effects and vintage-year fixed effects, with robust standard errors.

The dependent variable is the carry percentage. Here, I ignore the impact of the distribution rule on carry payouts and examine the nominal carry percentage. Fund size is positive and significant in regressions 1, 3, and 4. In regression 2, I include both fund size and lagged fund size as separate variables. The coefficient on fund size is similar to the other regressions; it remains marginally significant, as are both variables taken together ($F = 5.54, i = 0.06$).

Fund number is also a positive and significant predictor of the carry percentage. The likely underlying story is twofold. First, VC firms that have continued to raise new funds over an extended period are likely to be of high quality. Second, investors are likely to resist paying a high carry (above 20 percent) until a VC firm has proven itself through the performance of its early funds.

An above-median sold/total ratio is generally marginally significant. However, in regression 5, the continuous sold/total ratio is insignificant. Finally, venture-firm age takes a significant negative coefficient. The interpretation of this result is unclear, given that I separately control for total dollars raised.

C. Distribution Rule

To measure the VC-friendliness of the distribution rule, I create a distribution coefficient—the ratio of the total carry that a VC receives under the rule specified in the agreement to the amount of carry that a VC would have received under the most pro-investor rule (Escrow). The distribution coefficient is based on the actual distribution rule and carry percentage for each of my funds, and on the investment and payout schedules of an average fund with the same vintage year. As discussed

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39 For anecdotal evidence that some high-performing VCs raise their carry percentage, see Kaplan, *Accel Partners VII* at 1 (cited in note 15). Accel already charged a 2.5 percent management fee and 25 percent carry, and wanted to raise its carry to 30 percent. Kaplan writes: "At a 30 percent carry, Accel would join a select group of private equity firms that included Bain Capital; Kleiner Perkins Caulfield & Byers; and, under some circumstances, Benchmark Capital." Id.

before, rules for cash distributions are somewhat different from rules for securities distributions. I report the results for cash distributions.

Figure C summarizes the distribution coefficients for funds in my sample. The coefficients for distributions of cash vary from 1 (for one fund that uses the Escrow method) to 44.20 (for funds that use the Ceiling 100 percent method). Distribution coefficients based on the rules for securities distributions would show an even larger spread, from 1 to 130.74, because four funds use the highly VC-friendly Payback method for securities distributions, but none do so for cash distributions. Figure D shows the value of the distribution rule as a ratio of the NPV of interest-free loan generated by the distribution rule over the fund's committed capital. It ranges from just over zero to 0.6.

Table 7, Panel A provides an ordinary least squares (OLS) regression analysis of which VC and fund characteristics predict the distribution coefficient. Because the distribution coefficient depends on the timing and amount of distributions, it cannot be readily calculated for currently unliquidated funds. Thus, in Panel A, I limit the sample to funds raised before 1997. The vintage-year restriction reduces the size of my sample; thus, to preserve degrees of freedom, I do not use vintage-year fixed effects, as I do in Tables 5 and 6. I use venture-firm random effects with robust standard errors, as in prior tables. As discussed before, rules for cash distributions are somewhat different from rules for securities distributions. I report the results for rules governing cash distributions. The results are similar for the securities distribution rules (not reported). I otherwise use the same independent variables as in Tables 5 and 6, where I study the predictors of management fee and carry.

The only significant predictor of the loan value is the vintage year. In robustness checks, I study other firm and fund characteristics, such as location of the VC, dollars invested, and so forth. None emerge as significant.

One problem with the distribution coefficient is that its value is determined ex post based on performance that was not known to fund participants when the partnership agreement was signed. In Panel B, I instead use an ordinal ranking of distribution rules. This measure is independent of the fund's ex post performance and therefore might better reflect the parties' expectations when they were negotiating the agreement. Because this measure does not depend on performance, I do not need to restrict the sample to fully liquidated funds. All regressions are ordered probit with venture firm clusters and robust standard errors. The dependent variable takes a value of 1 when the distribution rule is Escrow; 2 for Return First; 3 for 125 Percent Ceiling; 4 for 120 Percent Ceiling; 5 for 115 Percent Ceiling; 6 for 110 Percent Ceiling; 7 for 100 Percent Ceiling; and 8 for Payback—thus higher values indicate more VC-friendly rules. All independent variables are the

same as in Table 5, Table 6, and Table 7, Panel A. No variable is a significant predictor of the distribution rule. Fund vintage year, which was significant in Panel A, is positive but insignificant.

D. Are Distribution Provisions Determined by Lawyers?

The previous Part raises a puzzle—distribution rules can have a large effect on VC compensation, yet both VCs and investors claim to understand them poorly, and the variation in distribution rules is not strongly predicted by fund or venture firm characteristics. What else might predict this variation?

Because distribution provisions are law-intensive, one possibility is that some VCs leave the choice of a distribution rule to lawyers, who reuse standard forms from one client to another. In my interviews, VCs often disclaimed knowledge of the details of the distribution rules, explaining that lawyers wrote the distribution provisions. The corporate VC lawyers who write the bulk of the partnership agreements often disclaimed knowledge as well, saying distribution provisions were the province of the tax lawyers. If lawyers determine distribution rules, however, one might expect that distribution rules drafted by the same law firms for different venture firms would be similar. This is not so.

I have only partial data on which law firm drafted which agreement. The relevant subset of my data contains three clusters of agreements. In each cluster, one law firm wrote agreements for three VC firms; each VC firm used those agreements for several funds. I look at distribution provisions within each law-firm cluster, across funds and firms, to see whether there is substantial variation. For each agreement, I look separately at cash and in-kind distribution provisions. The results are reported in Table 7, Panel C. The upper line in each cell is the distribution method for cash; the bottom line is the distribution method for securities.

The least we can say is that law firms do not blindly reuse the same standard set of distribution provisions for all clients. None of the three law firms repeated the exact combination of distribution arrangements. For example, law firm B had the same arrangements for two of its VC firms, but a completely different arrangement for the third. Law firms A and C had different provisions for each of the three VC firms in my sample.

This discussion cannot completely refute the hypothesis that lawyers determine distribution provisions. Large law firms, like the ones in my sample, may have several attorneys writing partnership agreements, and therefore may have several types of agreements in their libraries, which other attorneys then reuse without consulting their clients or advise their clients to use. Still, the amount of heterogeneity is surprisingly

high and suggests at least some customization.[40] The puzzle of why VC firms choose the distribution rules that they do remains unsolved.

E. Total Compensation

In Table 8, I ask what predicts overall VC compensation, taking all three elements of compensation into account and holding fund size constant. To isolate the impact of contractual provisions on compensation, I assume that each of my funds has $100 million in committed capital, makes only cash distributions, and has the investment and distribution schedule that is average for a fund of that vintage year. For funds raised after 1997, I use the extrapolation procedure described in Part II.C.4. I use the actual compensation terms (management-fee formula, carry percent, and distribution rule) for each fund from my partnership agreements. The dependent variable is the sum of the NPV of VC's carry (which incorporates the value of the distribution rule) and the NPV of the management fee. Independent variables are the same as in Tables 5 through 7. Because the dependent variable is based on a true compensation scheme found in each agreement, applied to an assumed fund size of $100 million, the independent variable "fund size" (the true size of each fund) functions here only as a proxy for the VC's quality. All regressions are OLS with venture-firm random effects, vintage-year fixed effects, and robust standard errors.

I find that past performance predicts current compensation. An above-median sold/total ratio predicts higher compensation, as does a below-median failed/total ratio. However, in regression 5, continuous sold/total and failed/total measures are insignificant. Thus, if more successful VCs are able to raise larger funds, they may get a double benefit—they will earn the management fee and carry on a larger base, and may also earn higher compensation per dollar of committed capital.

Vintage year is also a strong positive predictor of total compensation, even after controlling for fund size and number, and for past performance. This suggests that, on average, VC compensation has been rising over time.

IV. FUND SIZE

As discussed above, the management fee is typically calculated as a portion of fund size. And carry, measured in dollars, is directly related to fund size. Thus, fund size is a strong predictor of VCs' overall take-home pay. Indeed, in regressions similar to Table 8, in which I

[40] None of the VC firms in my sample changed law firms across funds. Thus, the intra–law firm differences cannot be explained by lawyers moving from one firm to another and taking both their clients and agreements with them.

measure VC compensation in dollars and use actual fund size rather than an assumed $100 million fund, fund size strongly predicts VC compensation and swamps all other measures. In this Part, I study the predictors of fund size. To do so, I formulate the following hypotheses:

Hypothesis 1a: positive relationship between the size of a new fund and the size of the VC's past funds. The size of a VC's prior funds may positively predict the size of newer funds. Several sources might contribute to this relationship. First, if fund size is associated with VC quality, then VCs who raised larger funds in the past should be able to raise larger funds in the future. If my proxies for VC quality (sold/total, failed/total, and so forth) are imperfect, as they surely are, this relationship might exist even controlling for those proxies. Second, VCs who have run larger funds in the past have organizational resources that can be devoted both to raising new, larger funds and to investing a larger amount of capital. Third, fund sizes may be "sticky" for several reasons. If current investors know more about a VC's quality than outsiders do (or at least think they know more), then, other things equal, investors may prefer to reinvest with the same VCs rather than switching to another VC, which would make fund sizes "sticky." Many VCs encourage stickiness by offering the first opportunity to invest in a new fund to investors in the previous fund, and often offering loyal investors other benefits, such as a seat on the advisory board. Investor "stickiness" may also reflect transaction costs: reinvesting with the same VC involves lower investigative efforts.

Hypothesis 1b: positive relationship between the size of a new fund and the VC's past performance. VCs with better past performance, as measured by the sold/total or IPO/total ratio, should be able to raise larger funds.

Hypothesis 1c: positive relationship between past and current size and between past performance and current size only for some VCs. The relationships posited in Hypotheses 1a and 1b may exist only for a subset of VCs. First, the size and performance of the immediately preceding fund should be lesser predictors of fund size for a new fund raised by an older VC because older VCs are more likely to be judged on their long-term record. Second, among young VCs, there might be a difference between those who were "good" from the outset (as proxied by later raising multiple funds) for reasons not captured by my performance proxies, and other young VCs, holding performance constant. We might then expect a positive past/current size relationship for "good" young VCs but not others.

Hypothesis 1d: change in sizes between the current fund N *and the immediately preceding fund* N – 1 *is predicted by recent past performance.* If the size of fund *N – 1* reflects the VC's performance through fund *N – 2*, then we might expect that the change in size from fund *N – 1*

to fund *N* is predicted by the new performance information investors receive, and thus by the change in VC performance between funds *N – 2* and *N – 1*.

Unlike VC compensation, fund size is public information; therefore, I am able to use the entire universe of stand-alone venture funds from VentureXpert (not just the funds for which I have partnership agreements) to estimate the predictors of fund size. Because VC performance can be fully estimated only after the fund is liquidated, I restrict the sample to funds raised in 1997 and earlier.

A. Predictors of Fund Size

Table 9, Panel A reports the results. Columns (1) through (4) include all funds that VentureXpert defines as "venture funds" raised before 1997. Defining "venture funds" differently (for example, by restricting investment stage to "seed" and "early stage") does not significantly change the results. In Column (5), the sample is limited to funds run by "good" young VCs (funds 1 through 5), who went on to become successful by raising more than five funds in later years. In Column (6), the sample is funds run by "bad" young VCs (funds 1 through 5) who did not proceed to raise more than five funds overall. Because all funds in this Table are raised before 1997, enough time has elapsed to say that VCs who raised no funds since then are not likely to continue. In Column (7), the sample is funds run by old successful VCs (funds 6 and higher). All regressions are OLS with venture-firm and vintage-year fixed effects and venture-firm clusters.[41]

The dependent variable is fund size, in millions of 2008 dollars. Independent variables include: four size measures (the size of the VC's previous fund *N – 1*, the fund before that *N – 2*, the total dollars raised by that VC in all prior funds, and the above-median dummy for total dollars raised in all prior funds); two measures of cumulative past performance (dummy variables for above-median sold/total ratio and above-median failed/total ratio); and fund vintage year. Because I control for year of VC firm formation, the "total dollars previously raised" variable proxies for dollars raised per year and not for VC firm age.

I find support for Hypothesis 1a. As Columns (1) through (4) of Table 9 indicate, VCs who raised more money in the past raise more money in the future. Investors seem to have long-term memory: while both the size of the immediately preceding fund and total dollars raised

[41] In regressions that use my agreements-based sample of sixty-eight, the sample size does not allow me to use venture-firm fixed effects and clusters plus vintage-year fixed effects. Therefore, I have to use weaker specifications.

in all prior funds predict the size of a current fund, the total dollars that the VC raised in all prior funds is statistically a much stronger predictor.

Past performance matters, too (Hypothesis 1b): VCs with an above-median sold/total ratio raise larger funds. However, the IPO/total ratio does not predict new fund size (not reported). This is not consistent with the view that VCs seek to manipulate the more visible performance indicator provided by IPOs to boost future fundraisings, at the expense of broader, potentially more relevant indicators (companies sold, regardless of method). Investors do not seem to reward IPOs alone, at least not through higher fund sizes.

I next ask whether the link between past performance and current fund size is affected by the age of the VC. In Columns (5) through (7), I find evidence supporting Hypothesis 1c. Young VCs (on their first through fifth funds) who went on to raise more than five funds show a positive relationship between prior sold/total ratio and fund size (Column (5)). In unreported regressions, I also find strong predictive power of the total dollars raised by these VCs before this fund. However, young VCs who did not proceed past the fifth fund exhibited no such relationship (Column (6)).

Finally, in regression 7, I examine "good" young VCs once they become old (raised at least five prior funds). The relationship between past performance or lagged fund size and the current fund size disappears. This unexpected result deserves further explanation. It suggests that older VCs may, in part, be coasting on past reputation.

Note however that the venture-firm fixed effects capture any time-invariant component of venture-firm quality. Thus, if investors know (perhaps based on prior reputation of individuals), or believe, that some VC firms are simply good or bad, and this time-invariant component predicts fund size, this effect will be captured by the fixed effect and I will not observe it.

B. Predictors of Change in Fund Size

In Table 9, Panel B, I ask whether a change in prior performance predicts a change in fund size. The answer is no. I again use venture-firm fixed effects and clusters and vintage-year fixed effects. The dependent variable is the difference between the size of fund *N* and the size of fund *N – 1*. Independent variables are changed as well: total dollars raised before fund *N* minus total dollars raised before fund *N – 1*; the size of fund *N – 1* minus the size of fund *N – 2*; the sold/total ratio for all companies funded by a VC in funds prior to fund *N*, minus the same ratio for fund *N – 1*; the failed/total ratio prior to fund *N* minus the failed/total ratio prior to fund *N – 1*. I also control for fund number and fund vintage year. The results reported in Panel B are robust to changes in control variables.

There are two principal results. First, the prior change in fund size (or the prior change in total dollars raised by the VC in prior funds) is a *negative* predictor of a new change in fund size. This raises the possibility that some VC firms that raise especially large funds realize that they cannot find good investments for that amount of money and cut back size for their next fund, or that investors realize this and reduce the amounts they are willing to invest. Second, changes in performance only mildly predict changes in fund size. The change in sold/total ratio is marginally significant in regression 3, but only barely, and this result is sensitive to the choice of control variables. Thus, fund size seems to relate more strongly to the VC firm's long-term performance than to the performance of the immediately prior fund.

V. PAY-PERFORMANCE ELASTICITY OF VC COMPENSATION

I now ask what portion of the VC's total compensation comes from risky sources (carry). For this, I look at a series of hypothetical $100 million funds raised in each year between 1986 and 1997 (that is, fully liquidated funds). I assume that each fund has the average performance and investment/distribution schedule for that year. For simplicity, I use the compensation scheme comprised of the most common elements found in my agreements: 20 percent carry, 2.5 percent flat management fee based on committed capital, and Return First distribution rule. I calculate the NPV of both risky and riskless compensation using Sand Hill Econometrics data on capital calls, distributions, and profitability. This is, of course, an ex post estimate of compensation riskiness and may not reflect the parties' ex ante expectations. Still, the average over time should be a respectable measure of ex ante expectations.

Figure E reports the results. The portion of management fee in the total compensation package fluctuates between 40 percent (for funds of 1994 vintage, a relatively high-profit vintage year) and 78 percent (for funds of 1997 vintage, a low-profit year), with an average of 51 percent across this twelve-year period.

In Figure F, I estimate the pay-performance elasticity of VC compensation. For each of the vintage years between 1986 and 1997, I calculate full VC compensation based on the returns of an average fund raised in that year, assuming the same compensation scheme as in Figure E, and then estimate how much VC compensation would increase for a 1 percent increase in the total NPV of the fund's investments.

A 1 percent increase in fund returns translates into a 0.47 percent increase on average in total VC compensation across vintage years, with a low of 0.38 percent (in vintage year 1997) and a high of 0.5 percent (in vintage years 1989 and 1990). This is not surprising given that a significant portion of VC compensation does not depend on fund performance. These are averages across all funds. My estimate of

the pay-performance elasticity of VC compensation is only modestly higher than the elasticity of cash compensation estimated for CEOs of S&P 500 industrials (0.26 percent), somewhat higher than S&P 500 utilities (0.40 percent), and slightly lower than in S&P 500 financials (0.49 percent).[42] However, the CEO figures understate overall elasticity of compensation, because they exclude stock and stock option compensation. Overall, VC firm compensation elasticities fall in the same range as CEO elasticities.

VI. COMPENSATION COMPLEXITY AND INCOME SMOOTHING

A. Is Complexity Used to Hide True Compensation?

As we have seen in Part II.A, it is difficult to construct reasons for the management fee to be more complex than a percentage of committed capital or even a flat dollar amount, perhaps varying over time. The general executive compensation literature suggests that pay complexity can be used to camouflage the total level of compensation. This is only partly the case for VCs. As discussed above, distribution rules are both obscure and valuable. However, the picture is the opposite for the management fee. The more complex, more manipulable managed-capital base is systematically lower than the committed-capital base, yet the fee percentage is *not* systematically higher. This implies that use of a managed-capital base is associated with lower overall management-fee levels.

Additional analysis confirms the surface picture. I present basic summary statistics in Table 2, Panel B. The use of committed capital is associated with *higher* management fee NPV (on average, 16.84 percent of committed capital over eleven years versus 10.91 percent for use of managed capital). There is also no evidence of gaming within funds using the committed-capital base. The most straightforward formula (constant percentage) yields a *higher* NPV of management fee than a formula involving increasing or declining percentage, albeit not significantly so.

Another source of complexity is a change in formula in the mid-stream of a fund's life. Here, too, greater complexity predicts lower compensation. The principal change is from a committed-capital base to the lower managed-capital base, without an offsetting increase in the fee percentage. Funds that use the same formula throughout their lives have *higher* aggregate fees on average (16.85 percent of committed capital) than funds that change the formula mid-stream (12.93 percent of committed capital).

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42 See Murphy, *Executive Compensation* at 2524 table 7, 2526 figure 6B (cited in note 1).

This result survives in regressions in which I control for VC and fund characteristics, as reported in Table 10. The dependent variable in all columns is the NPV of management fee as a percent of the fund's committed capital.[43] All regressions are OLS with venture-firm random effects, vintage-year fixed effects, and robust standard errors. The results are similar with venture-firm fixed effects (but some variables drop out because of lack of variation within firms) and are also similar with fixed effects for year of venture firm formation (instead of fund vintage year), and without any time fixed effects.

Column (1) is the basic specification, containing only the rule dummies. Rule 1 through Rule 8 are dummies for formulas under which a management fee is calculated; the omitted rule is Rule 9 (increasing then declining percentage, change in base from committed to managed capital). The rules are numbered roughly in the order of increasing complexity and manipulability. The first four rules involve a nonmanipulable base, committed capital. The coefficients on the dummies for three of those rules (Rules 1, 2, and 4) are significant and positive, indicating that funds that calculate management fees under these rules have higher aggregate management fees. Economic significance is large as well. These three rules predict from 4.7 percent to 8.7 percent higher management fee NPV than for the omitted category. The coefficients for formulas based in full or in part on managed capital are insignificant or, for Rule 8, negative.

In Column (2), I add total dollars raised by the VC in all prior funds (normalized as discussed in Part I.C) and the age of the venture firm in the year when the fund was raised. In Column (3), I use fund size and fund number, both normalized, instead of the total dollars raised in prior funds and the age of the VC when the fund was raised. The results are very similar to those reported in Column (1). In robustness checks, I include other control variables, such as measures of prior performance and year of venture firm formation, with similar results (not reported).

In Column (4), instead of using dummies for individual rules, I use a proxy for complexity—a dummy for whether the formula changes during the fund's life (for example, the base switches from committed to managed capital, or the percentage changes over time). I include the same controls as in Column (3). The coefficient on the "changes" variable is negative and significant, indicating again that funds that use more complex management fee rules have lower total management

[43] For funds using managed capital as a base, I calculate the cumulative fee over eleven years based on Sand Hill Econometrics data on capital calls and distributions, and express that value as the percent of committed capital.

fees. In Column (5), I confirm that the simpler formula—based only on committed capital—predicts higher compensation for fee calculation. The coefficient on the "committed capital base" dummy variable is positive and highly significant.

B. What Predicts Complexity of Management Fee?

Next, I ask which venture firm or fund characteristics predict the degree of complexity of the management fee. I use a managed-capital base as a proxy for complexity. In Table 11, Panel A, I divide the funds in my sample into three groups. The dependent variable equals 0 for funds that use a committed-capital base in all years; 1 for funds that use a managed-capital base sometime during the second half of a fund's life (years 5–11); and 2 for funds that use a managed-capital base during the entire second half of a fund's life and at least sometime during the first half.[44] Thus, a higher group number indicates greater use of managed-capital base. I ask which fund or firm characteristics predict the choice among the three groups. All regressions are ordered probit with venture-firm and vintage-year fixed effects and robust standard errors.[45]

In Column (1), I ask whether basic VC characteristics predict the three choices for the management-fee base. As expected from Table 5, higher overall management fee predicts less use of a managed-capital base. In addition, controlling for management-fee level, older VCs and more reputable VCs (as measured by total dollars raised in prior funds) make less use of the managed-capital base. In Column (2), I add more measures of VC quality—the normalized sold/total and failed/total ratios. The results are consistent with those reported in Column (1). In addition, VCs with a higher portion of failed companies are more likely to use a managed-capital base.

These results only deepen the puzzle of why VC firms use a managed-capital base at all. Apparently, lower-quality VCs compete for business in part by charging lower management fees, as seen in Table 5. Some VCs do so not by simply charging a substantially lower percentage of committed capital but instead by keeping the percentage closer to that of better VCs, but applying it to a smaller base, which is also more complex and manipulable.

In Panel B, I ask what factors predict use of the classic management-fee formula (flat percentage of committed capital). This question is interesting because the choice to deviate from the traditional system

44 No fund in my sample used a managed-capital base in early years and switched to committed capital in later years.

45 I use venture-firm fixed effects rather than random effects, as in some earlier tables, because of Stata limitations on the use of random effects with ordered probit models.

might be more important than gradations within nontraditional systems. I use logit regressions with robust standard errors; the dependent variable equals 1 when the classic formula is used and 0 otherwise. Column (1) includes only basic independent variables (vintage year, total dollars raised, and VC age); Column (2) adds two measures of VC past performance (total dollars raised in all prior funds and the sold/total ratio, both normalized). In robustness checks, I also use fund size and number, and total management fee and carry, and find similar results, which are not reported here. Fund vintage year positively predicts the use of the classic formula. Thus, my data does not support the common perception that the flat fee system is being replaced by more complicated variations.

C. Are Management-fee Schedules Used to Smooth VC Incomes?

Because carry is based on the sales of portfolio companies, the stream of carry payments is cyclical (typically low in early years, high in later years), and often unpredictable. I next consider whether VCs use management-fee schedules to smooth their total income, either across multiple funds or across years within a single fund. A simple income-smoothing strategy would be to increase nonrisky compensation during the years when carry payouts are predictably low.

One possibility is income smoothing within funds. Because carry is higher in the later years of a fund's life, VCs can smooth their income by front-loading their management fees. This might be more likely for VCs who expect a high carry (as proxied by past success). A more complex possibility is income smoothing across funds. VCs commonly raise a series of funds; each fund generates a stream of management fees and carries. If VCs adopt across-funds income-smoothing strategies, then management-fee schedules should depend on the frequency of fundraisings. A VC who raises a new fund every four to six years can expect a stream of carry every four to six years; he might prefer higher management fees in the middle of each fund's life.

In Table 12, Panel A, I ask which factors predict income smoothing within a given fund. The dependent variable is the ratio of the NPV of the management fee that a VC earns during years 1–5 to the total NPV during the fund's entire eleven-year life. A higher value indicates a more front-loaded fee. All regressions are OLS with venture-firm random effects, vintage-year fixed effects, and robust standard errors. Column (1) is a basic specification investigating the relationship between the total VC compensation and front-loading of the management fee. Two findings emerge. First, more established VCs (who raised more capital in prior funds) are *less* likely to have a front-loaded fee, which is not consistent with income smoothing within funds. In robustness checks, I also use fund number as a proxy for VC

quality, with similar results—VCs who raised more funds in the past have management fees that are less front-loaded. Second, funds with higher total management fees are less likely to front-load their management fee. This might seem like a natural consequence of using managed capital–based fees: this base produces both lower total fee and a more front-loaded fee. However, there is nothing about the use of a particular base that requires these two outcomes to be linked. It is easy to structure a managed capital–based formula that would give the VC the same total compensation, with any variation one wants across the years of a fund's life, by using a time-varying fee percentage. Yet in practice, large variations in the fee percentage across time are not common.

In Column (2), I ask whether the VC firm's prior performance predicts front-loading of the management fee. The sold/total and failed/total ratios are not significant predictors of front-loading.

In Table 12, Panel B, I find evidence consistent with income smoothing across funds. The dependent variable here is a dummy that equals 1 if the management fee peaks in middle years of the fund's life and 0 otherwise. The key independent variable is the "Fundraising Cycle Dummy," which equals 1 if a VC firm raised prior funds every four to six years and 0 otherwise. Other control variables are similar to prior tables. All regressions are logit with venture-firm random effects and robust standard errors.

The Fundraising Cycle Dummy emerges as a strong predictor of a midstream peak in a fund's management fee, across all three specifications. This is consistent with the between-funds income-smoothing hypothesis. Total management fee is a significant negative predictor of a mid-fund-life fee peak; this result is consistent with prior tables.

CONCLUSION

This Article contributes to the literature on the venture capital industry, and on executive compensation more generally, by analyzing the compensation of VCs. I show that VC compensation has an important third element—the distribution rule—which determines the value of an interest-free loan from investors to VCs. This element is economically large but has not been discussed in prior work. I also find substantial variation in compensation levels across VC firms, again in contrast to prior work. Some of this variation is predicted by measures of VC quality, with better VCs receiving a higher fraction of total fund NPV, both through higher management fee and through higher carry percentage; but some is not. In particular, distribution rules vary widely across funds, yet their VC-friendliness is not strongly predicted by proxies for VC quality. Nor are distribution rules simply delegated to lawyers—the same law firm will often draft different distribution rules

for different clients. Better VCs tend to raise larger funds, as do VCs who have raised larger funds before. Some elements of VC compensation appear to be used to smooth VC incomes. Compensation complexity predicts lower total compensation, at least in management fee, in contrast to the compensation of corporate executives.

My findings have implications for executive compensation. They suggest that the legal and institutional barriers to investor participation in setting executive compensation do not fully explain some key features of compensation contracts. Investors in venture funds are able to negotiate compensation terms directly, yet VC compensation is still complex—sometimes counterproductively so as more complex management-fee rules are more manipulable than simpler rules—spread across multiple elements, and, at least for distribution rules, opaque and poorly understood by investors and even by VCs. The pay-performance sensitivity is very similar to that of public company executives. On the other hand, with the exception of distribution rules, there is no evidence that the contractual complexity is used to increase stealth compensation.

FIGURE A
NPV OF MANAGEMENT FEES BY VC FUND
(PERCENT OF COMMITTED CAPITAL)

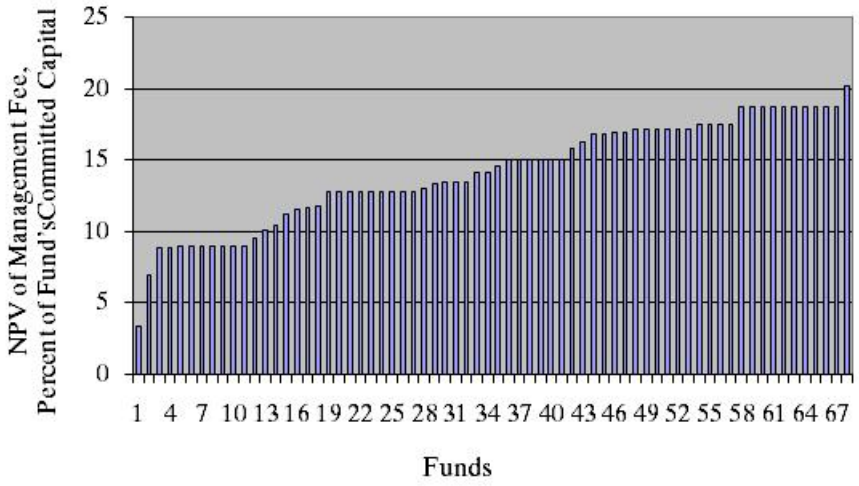


FIGURE B
CARRY, BY VC FUND

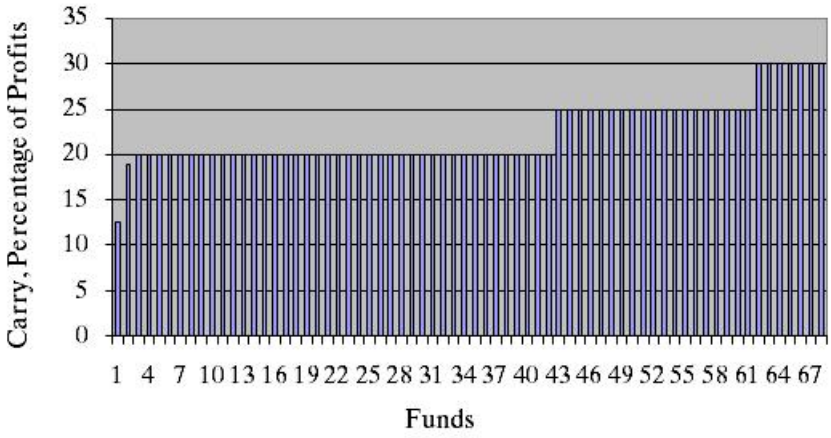


FIGURE C
DISTRIBUTION COEFFICIENT, BY VC FUND
(NPV OF CARRY UNDER RULE IN AGREEMENT/NPV OF CARRY UNDER MOST PRO-INVESTOR RULE)

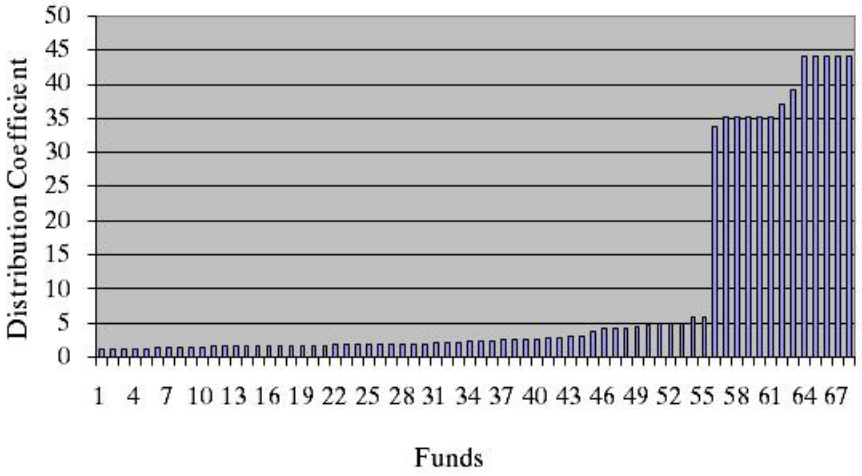


FIGURE D
VALUE OF DISTRIBUTION RULE, BY VC FUND
(NPV OF INTEREST-FREE LOAN UNDER RULE IN AGREEMENT/FUND'S COMMITTED CAPITAL)

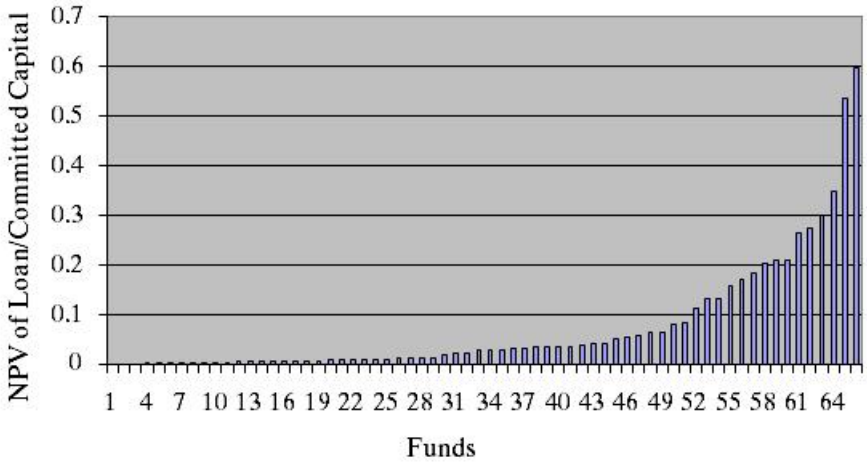
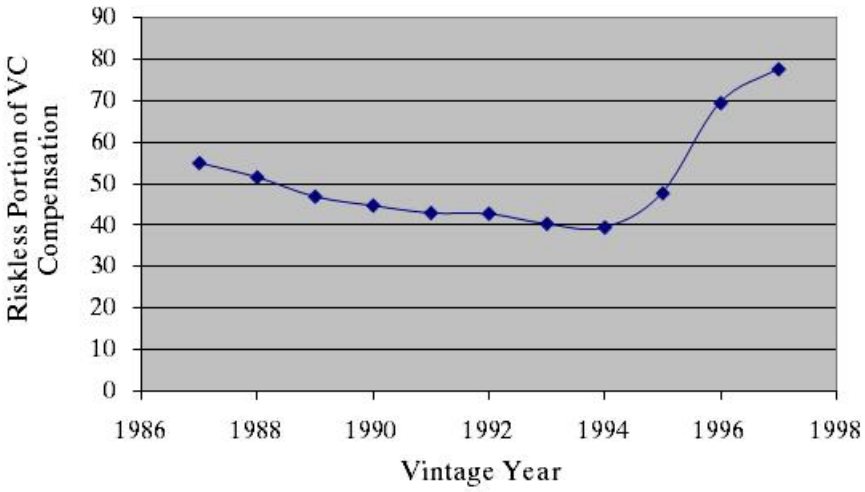
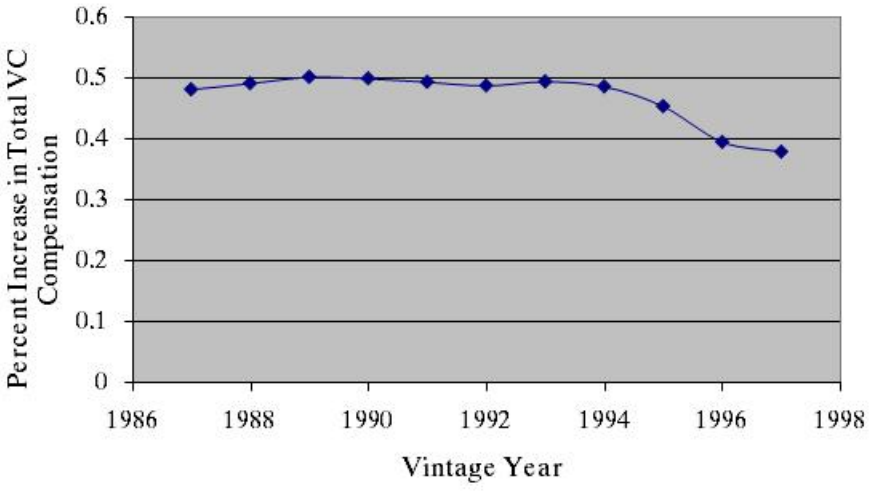


FIGURE E
NPV OF NONRISKY COMPENSATION (MANAGEMENT FEE)
AS A PERCENT OF TOTAL VC COMPENSATION, BY VINTAGE YEAR



Note: Represents average funds raised in the corresponding year. Assume 20 percent carry; management fee 2.5 percent of committed capital; Return First Distribution Rule.

FIGURE F
IMPACT OF A 1 PERCENT CHANGE IN FUND PROFITABILITY
ON TOTAL VC COMPENSATION, BY VINTAGE YEAR



Note: Represents percent change in total VC compensation for average fund raised in the corresponding year. Assumes 20 percent carry, management fee of 2.5 percent of committed capital, and Return First Distribution Rule.

TABLE 1
SUMMARY STATISTICS

	Total Number	Mean for My Sample	Mean in All VentureXpert Funds Raised after 1983	Minimum for My Sample	Maximum for My Sample
	(1)	(2)	(3)	(4)	(5)
Venture Funds (Firms)	68 (28)				
Vintage Year of Fund		1997	1995	1983	2005
Year of VC Firm Formation		1987	1988	1963	2004
Fund Size (in 2008 $M)		401.70	215.19	30.51	1105.94
Fund Number		5	2	1	13
Management Fee (as Percent of Committed Cap)		14.14		3.66	20.15
Management Fee ($M)		56.58		3.98	207.33
Carry (Percent of Profits)		22.30		12.5	30
Ratio IPO/All Companies by Fund		0.125	0.006	0	0.5
Ratio Sold/All Companies by Fund		0.449	0.278	0.125	1
California Funds (Firms)	36 (17)				
New York Funds (Firms)	3 (3)				
Massachusetts Funds (Firms)	3 (3)				

Note: All funds are US-based venture funds raised by stand-alone venture capital firms. Partnership agreements were provided by venture capitalists and limited partners on a confidential basis.

TABLE 2

Panel A

Rules for Management Fee Calculation and Summary Statistics

Rule No	Rule Description	Funds	Firms	Mean NPV As Percent of Committed Capital
1	Constant Percent; Committed Capital Base	21	8	16.85
2	Declining Percent; Committed Capital Base	15	7	16.62
3	Increasing Percent, Then Declining Percent; Committed Capital Base	2	1	11.99
4	Constant Percent; Base Is Committed Capital Declining by Formula	1	1	20.15
5	Constant Percent; Switch from Committed to Managed Capital Base	5	3	9.29
6	Increasing Percent; Switch from Committed to Managed Capital Base	3	2	11.68
7	Declining Percent; Switch from Committed to Managed Capital Base	18	5	11.14
8	Increasing Percent, Then Declining Percent; Managed Capital Base	1	1	3.32
9	Increasing Percent, Then Declining Percent; Switch from Committed to Managed Capital Base	3	1	12.39

Panel B

Summary Statistics for Groups of Rules

Group-of-rules Description	Funds	Firms	Mean NPV
Committed Capital Base Only	38	16	16.84
Base Other Than Only Committed Capital	30	12	10.91
Committed Capital Base with Percent Constant	21	8	16.85
Committed Capital Base with Percent Not Constant	17	8	16.57
Fee Formula Changes in Midstream	47	20	12.93
Fee Formula Does Not Change in Midstream	21	8	16.85

TABLE 3
NUMBER OF VENTURE FUNDS USING DIFFERENT DISTRIBUTION METHODS, FOR DISTRIBUTIONS OF CASH AND SECURITIES

Distribution Method	Cash Distributions	Securities Distributions
Escrow. VCs receive no carry until liquidation of fund. Carry allocated to VCs is place in escrow; interest to fund.	1	1
Return 100 Percent First. VCs receive no carry until investors get distributions equal to capital contributions. Afterwards, VCs receive full carry at each distribution.	30	30
125 Percent Ceiling. VCs receive carry only if estimated NPV of fund, after distribution, is above 125 percent of the cost value of securities.	2	2
120 Percent Ceiling. VCs receive carry only if estimated NPV of fund, after distribution, is above 120 percent of the cost value of securities	13	11
115 Percent Ceiling. VCs receive carry only if estimated NPV of fund, after distribution, is above 115 percent of the cost value of securities.	2	2
110 Percent Ceiling. VCs receive carry only if estimated NPV of fund, after distribution, is above 110 percent of the cost value of securities.	0	2
100 Percent Ceiling. VCs receive carry only if estimated NPV of fund, after distribution, is above 100 percent of the cost value of securities.	20	16
Payback with No Interest. VCs receive a portion of revenues at each distribution, while they are only entitled to a portion of profits. VCs repay the difference at liquidation time, with no interest.	0	4

Note: Sample is sixty-eight venture funds, raised by twenty-one firms.

TABLE 4

Panel A

Net present value of risky compensation that the VC receives under different distribution rules. The fund is assumed to be $100 million with 20 percent carry. Each row has a result for a fund raised in the corresponding year, with an average schedule of capital calls and distributions for all funds raised in that year, based on data from Sand Hill Econometrics. Only fully liquidated funds are used for this Table (raised before 1997).

Vintage Year	Escrow	Return First	125 Percent Ceiling	120 Percent Ceiling	115 Percent Ceiling	110 Percent Ceiling	100 Percent Ceiling	Payback
1987	9.39	15.21	16.32	16.54	16.80	17.08	17.66	23.31
1988	10.83	17.47	17.97	18.18	18.41	18.66	19.17	25.43
1989	13.00	21.04	20.98	21.22	21.49	21.77	22.36	28.95
1990	13.87	22.95	22.65	22.91	23.18	23.45	24.04	30.69
1991	14.48	24.66	24.43	24.70	24.99	25.29	25.94	32.16
1992	14.30	24.84	25.04	25.31	25.60	25.89	26.52	32.13
1993	15.88	27.43	28.01	28.28	28.56	28.85	29.46	34.56
1994	16.01	28.47	29.60	29.88	30.15	30.43	30.99	35.58
1995	10.80	20.38	21.70	21.99	22.29	22.58	23.18	27.04
1996	3.66	8.19	10.16	10.37	10.59	10.84	11.35	14.72

Panel B

Net present value of risky VC compensation, net present value of return to investors, and portion of fund profits allocated to VCs, both before and after payment of management fee. Calculated separately under eight different distribution rules; and under three different assumptions about capital calls, payouts, and fund profitability (low-, medium-, and high-profit funds, based on average funds raised in 1997, 1995, and 1993, respectively). The fund is assumed to be $100 million, with 20 percent carry, and management fee calculated as 2.5 percent of committed capital. Profit is assumed to be measured before management fee.

	Escrow	Return First	125 Percent Ceiling	120 Percent Ceiling	115 Percent Ceiling	110 Percent Ceiling	100 Percent Ceiling	Payback
Low-profit Fund (Average for Vintage Year 1997)								
VC Carry	9.17	12.38	15.01	15.22	15.45	15.70	16.20	19.56
Investors	-11.87	-15.07	-17.71	-17.92	-18.14	-18.39	-18.89	-22.26
Total	-2.69	-2.69	-2.69	-2.69	-2.69	-2.69	-2.69	-2.69
Percent of NPV Allocated to VC, Excluding Management Fee	>100	>100	>100	>100	>100	>100	>100	>100
VC Carry Plus Fee	27.92	31.13	•3.76	33.97	34.2	34.45	34.95	38.31
Investors Minus Fee	-30.62	-33.82	-36.46	-36.67	-36.89	-37.14	-37.64	-41.01
Percent of NPV Allocated to VC, Including Management Fee	>100	>100	>100	>100	>100	>100	>100	>100
Medium-profit Fund (Average for Vintage Year 1995)								
VC	10.80	20.38	21.70	21.99	22.29	22.58	23.18	27.04
Investors	59.44	49.86	48.54	48.25	47.95	47.66	47.06	43.20
Total	70.24	70.24	70.24	70.24	70.24	70.24	70.24	70.24
Percent of NPV Allocated to VC, Excluding Management Fee	15.38	29.01	30.89	31.31	31.73	32.15	33.00	38.50
VC Carry Plus Fee	29.55	39.13	40.45	40.74	41.04	41.33	41.93	45.79
Investors Minus Fee	40.69	31.11	29.79	29.5	29.2	28.91	28.31	24.45
Percent of NPV Allocated to VC, Including Management Fee	42.07	55.71	57.59	58.00	58.43	58.84	59.70	65.19
High-profit Fund (Average for Vintage Year 1993)								
VC	15.88	27.43	28.01	28.28	28.56	28.85	29.46	34.56
Investors	91.97	80.42	79.84	79.57	79.29	79	78.39	73.29
Total	107.85	107.85	107.85	107.85	107.85	107.85	107.85	107.85
Percent of NPV Allocated to VC, Excluding Management Fee	14.72	25.43	25.97	26.22	26.48	26.75	27.32	32.04
VC Carry Plus Fee	34.63	46.18	46.76	47.03	47.31	47.6	48.21	53.31
Investors Minus Fee	73.22	61.67	61.09	60.82	60.54	60.25	59.64	54.54
Percent of NPV Allocated to VC, Including Management Fee	32.11	42.82	43.36	43.61	43.87	44.14	44.70	49.43

Panel C

Effect of changes in management fee, carry, and distribution rule on VC compensation, for average $100M fund raised in 1995 (medium profitability year). In Columns (1) and (2), reported values are for NPV of management fee, calculated as 2 percent and 2.5 percent of committed capital, respectively, over eleven years. In Columns (3) and (4), the distribution rule is held constant (Return First, most popular rule) and carry percentage changes from 20 percent to 25 percent, respectively. In Columns (5), (6), and (7), the carry percentage is held constant (most popular, 20 percent) and the distribution rule changes from the second-most popular rule (100 percent ceiling) to the most popular rule (Return First) to the most pro-VC rule (Payback), respectively. Discount rate is 7 percent for management fee and 10 percent for carry annually.

	NPV of Management Fee		NPV of Carry (Return First Distribution Rule)		Effect of Distribution Rule on NPV of Carry (20 Percent Carry)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Flat 2 Percent	Flat 2.5 Percent	20 Percent Carry	25 Percent Carry	100 Percent Ceiling	Return First	Payback
Values	$15.00M	$18.75M	$20.40M	$25.47M	$23.18M	$20.40M	$27.04M
Difference	$3.75M		$5.07M		$2.78M		
Ratio	1.25		1.25		1.14		
Difference							$6.64M
Ratio							1.33

TABLE 5

This Table shows predictors of the cumulative management fee over the lifetime of a fund. The dependent variable is net present value of management fee as a percent of fund's committed capital over the 11-year fund life. Independent variables are: normalized fund size; lagged normalized fund size; normalized fund number; dummy for above-median sold/total ratio (ratio of sold companies—through IPO, acquisition, merger, buyout—to all companies funded by this venture firm in all prior funds); dummy for above-median failed/total ratio (ratio of failed companies—bankruptcy and defunct—to all companies funded by this firm in all prior funds); dummy for above-median prior fundraising (based on total dollars raised by VC firm prior to this fund); normalized total dollars raised prior to this fund; normalized sold/total and failed/total ratios; venture firm age when this fund was raised. All regressions are OLS with venture-firm random effects, vintage-year fixed effects, and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	NPV Management Fee over 11 Years Percentage Committed Capital				
	(1)	(2)	(3)	(4)	(5)
Fund Size, Normalized	**1.476**	1.202	**1.548**	**1.471**	0.73
	(1.82)*	(1.4)	**(1.86***	**(2.16)****	(0.88)
Fund Number, Normalized	0.46	0.182	0.477	0.895	0.802
	(0.30)	(0.12)	(0.31)	(0.67)	(0.52)
Above-median Sold/ Total Companies Ratio	**2.302**	**1.763**	**2.296**	**2.305**	
	(2.40)**	**(2.02)****	**(2.35)****	**(2.44)****	
Above-median Failed/ Total Companies Ratio	-0.942	-0.779	-0.938	-0.999	
	(1.59)	(1.62)	(1.54)	(1.63)	
Lagged Fund Size, Normalized		**0.866**			
		(1.67)*			
Above-median Total Dollars Raised			-0.254		
			(0.43)		
Total Dollars Raised, Normalized				-1.327	-1.405
				(1.44)	(1.22)
Sold/Total Companies Ratio					-0.819
					(0.19)
Failed/Total Companies Ratio					**-5.295**
					(1.91)*
Fund Vintage Year	0.277	0.263	0.271	0.200	0.185
	(1.09)	(0.99)	(1.06)	(0.92)	(0.79)
Venture Firm Age When Fund Raised	-0.132	-0.097	-0.128	-0.14	-0.071
	(0.79)	(0.58)	(0.77)	(0.89)	(0.37)
Constant	-534.953	-508.464	-521.779	-380.11	-351.916
	(1.05)	(0.95)	(1.02)	(0.88)	(0.75)
Venture-firm Random Effects; Vintage-year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Funds	66	66	66	66	66
Firms	28	28	28	28	28

TABLE 6

Predictors of carry. The dependent variable is carry as a percent of fund's profits. Independent variables are: normalized fund size; lagged normalized fund size; normalized fund number; dummy for above-median sold/total ratio (ratio of sold companies—through IPO, acquisition, merger, buyout—to all companies funded by this venture firm in all prior funds); dummy for above-median failed/total ratio (ratio of failed companies—bankruptcy and defunct—to all companies funded by this firm in all prior funds); dummy for above-median prior fundraising (based on total dollars raised by VC firm prior to this fund); normalized total dollars raised prior to this fund; normalized sold/total and failed/total ratios; venture firm age when this fund was raised. All regressions are OLS with venture-firm random effects, vintage-year fixed effects, and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	Carried Interest, Percent Profits				
	(1)	(2)	(3)	(4)	(5)
Fund Size, Normalized	**1.935**	**1.9**	**2.001**	**1.917**	**1.615**
	(2.39)**	**(1.91)***	**(2.17)****	**(2.24)****	**(1.72)***
Fund Number, Normalized	**2.866**	**2.868**	**2.889**	**2.81**	**2.45**
	(2.72)***	**(2.66)*****	**(2.72)*****	**(2.56)****	**(1.98)****
Above-median Sold/Total Companies Ratio	**1.571**	1.571	**1.592**	**1.588**	
	(1.77)*	(1.49)	**(1.77)***	**(1.83)***	
Above-median Failed/Total Companies Ratio	-0.804	-0.785	-0.789	-0.79	
	(0.84)	(0.84)	(0.82)	(0.80)	
Lagged Fund Size, Normalized		0.048			
		(0.05)			
Above-median Total Dollars Raised			-0.26		
			(0.19)		
Total Dollars Raised, Normalized				0.205	0.365
				(0.16)	(0.29)
Sold/Total Companies Ratio					5.029
					(1.05)
Failed/Total Companies Ratio					1.936
					(0.64)
Fund Vintage Year	-0.215	-0.22	-0.223	-0.206	-0.182
	(1.20)	(1.16)	(1.23)	(1.12)	(0.82)
Venture Firm Age When Fund Raised	**-0.285**	**-0.285**	**-0.282**	**-0.285**	-0.256
	(2.46)**	**(2.39)****	**(2.36)****	**(2.39)****	(1.80)*
Constant	454.124	462.581	469.82	435.346	387.792
	(1.26)	(1.22)	(1.29)	(1.19)	(0.87)
Venture-firm Random Effects; Vintage-year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Funds	66	66	66	66	66
Firms	28	28	28	28	28

TABLE 7

Panel A

Ordinary least squares regressions for predictors of distribution rule. The dependent variable is the distribution coefficient for cash distribution (ratio of expected carry under the distribution rule specified in the partnership agreement over expected carry under the most pro-investor distribution rule), for each fund in my sample. Independent variables are: normalized fund size; lagged normalized fund size; normalized fund number; dummy for above- median sold/total ratio (ratio of sold companies—through IPO, acquisition, merger, buyout—to all companies funded by this venture firm in all prior funds); dummy for above-median failed/total ratio (ratio of failed companies—bankruptcy and defunct—to all companies funded by this firm in all prior funds); dummy for above-median prior fundraising (based on total dollars raised by VC firm prior to this fund); normalized total dollars raised prior to this fund; normalized sold/total and failed/total ratios; venture firm age when this fund was raised. All regressions use venture-firm random effects and robust standard errors. The sample is limited to fully liquidated funds—funds raised in 1997 and earlier. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	Distribution Coefficient				
	(1)	(2)	(3)	(4)	(5)
Fund Size, Normalized	0.064	0.155	-0.466	0.234	0.346
	(0.21)	(0.27)	(1.42)	(0.66)	(0.87)
Fund Number, Normalized	-0.278	-0.273	-0.398	-0.117	-0.297
	(0.70)	(0.66)	(1.34)	(0.22)	(0.62)
Above-median Sold/Total Companies Ratio	0.07	0.076	0.319	-0.059	
	(0.19)	(0.21)	(1.33)	(0.14)	
Above-median Failed/Total Companies Ratio	0.305	0.284	**0.572**	0.335	
	(1.04)	(0.85)	**(2.10)****	(1.08)	
Lagged Fund Size, Normalized		-0.095			
		(0.19)			
Above-median Total Dollars Raised			**1.247**		
			(3.79)***		
Total Dollars Raised, Normalized				-0.526	-0.418
				(0.70)	(0.60)
Sold/Total Companies Ratio					0.205
					(0.19)
Failed/Total Companies Ratio					-0.178
					(0.43)
Fund Vintage Year	**0.147**	**0.145**	**0.162**	**0.127**	**0.16**
	(2.80)***	**(2.64)*****	**(4.32)*****	**(1.94)***	**(2.98)*****
Venture-firm Age When Fund Raised	0.038	0.037	0.004	0.04	0.048
	(1.26)	(1.19)	(0.19)	(1.17)	(1.49)
Constant	-291.416	-287.824	-321.519	–252.489	-316.818
	(2.78)***	(2.62)***	(4.30)***	(1.92)*	(2.96)***
Venture-firm Random Effects	Yes	Yes	Yes	Yes	Yes
Funds	26	26	26	26	26
Firms	12	12	12	12	12

Panel B

Ordered probit regressions for predictors of distribution rule for cash distributions. The dependent variable equals 1 when the distribution rule is Escrow; 2 for Return First; 3 for Ceiling 125 percent; 4 for Ceiling 120 percent; 5 for Ceiling 115 percent; 6 for Ceiling 110 percent; 7 for 100 percent; 8 for Payback. Independent variables are the same as in Panel A. All regressions venture firm clusters. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	(1)	(2)	(3)	(4)	(5)
Fund Size, Normalized	-0.005	0.209	-0.064	-0.134	-0.165
	(0.02)	(1.03)	(0.28)	(0.58)	(0.72)
Fund Number, Normalized	-0.124	-0.169	-0.154	-0.266	-0.242
	(0.48)	(0.64)	(0.62)	(1.06)	(0.94)
Above-median Sold/Total Companies Ratio	0.287	0.271	0.294	0.369	
	(0.82)	(0.81)	(0.84)	(1.07)	
Above-median Failed/Total Companies Ratio	0.495	0.489	0.498	0.469	
	(1.49)	(1.44)	(1.52)	(1.45)	
Lagged Fund Size, Normalized		**-0.371**			
		(1.90)*			
Above-median Total Dollars Raised			0.197		
			(0.50)		
Total Dollars Raised, Normalized				0.698	0.646
				(1.38)	(1.24)
Sold/Total Companies Ratio					0.307
					(0.17)
Failed/Total Companies Ratio					0.586
					(0.82)
Fund Vintage Year	0.066	0.078	0.069	0.081	0.069
	(1.17)	(1.37)	(1.24)	(1.49)	(1.21)
Venture-firm Age When Fund Raised	0.028	0.033	0.027	0.028	0.031
	(0.67)	(0.77)	(0.63)	(0.64)	(0.70)
Venture-firm Random Effects	Yes	Yes	Yes	Yes	Yes
Funds	66	66	66	66	66
Firms	28	28	28	28	28

Panel C

Summary of distribution arrangements in partnership agreements written by the same law firm for different VC firms. The data set includes three law firms, each servicing three VC firms. Each VC firm has multiple fund agreements written by that law firm. Each partnership agreement has separate provisions for cash and securities distributions. Cash distribution provisions are reported in the top line of each cell; securities distribution, in the bottom line.

	First VC Firm	Second VC Firm	Third VC Firm
Law Firm *A*	100 percent ceiling	Return capital first	100 percent ceiling
	100 percent ceiling	125 percent ceiling	Payback no interest
Law Firm *B*	125 percent ceiling	120 percent ceiling	120 percent ceiling
	125 percent ceiling	Payback no interest	Payback no interest
Law Firm *C*	120 percent ceiling	Return capital first	100 percent ceiling
	Payback no interest	Return capital first	Payback no interest

TABLE 8

The dependent variable is the total VC compensation—NPV of carry payout under the distribution rule specified in the agreement, plus NPV of the management fee. All funds are assumed to be $100M. Independent variables are: normalized fund size; lagged normalized fund size; normalized fund number; dummy for above- median sold/total ratio (ratio of sold companies—through IPO, acquisition, merger, buyout—to all companies funded by this venture firm in all prior funds); dummy for above-median failed/total ratio (ratio of failed companies—bankruptcy and defunct—to all companies funded by this firm in all prior funds); dummy for above-median prior fundraising (based on total dollars raised by VC firm prior to this fund); normalized total dollars raised prior to this fund; normalized sold/total and failed/total ratios; venture firm age when this fund was raised. All regressions are OLS with vintage-year fixed effects, venture-firm random effects, and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	Total Compensation, $100M Fund				
	(1)	(2)	(3)	(4)	(5)
Fund Size, Normalized	**1.634**	1.432	1.595	1.553	0.679
	(1.66)*	(1.25)	(1.53)	(1.62)	(0.57)
Fund Number, Normalized	0.283	0.137	-0.001	0.804	0.8
	(0.14)	(0.07)	0.00	(0.40)	(0.38)
Above-median Sold/Total Companies Ratio	**2.269**	1.974	**2.295**	**2.227**	
	(1.92)*	(1.54)	**(2.02)****	**(1.84)***	
Above-median Failed/Total Companies Ratio	**-1.96**	**-1.855**	**-1.993**	**-1.97**	
	(2.30)**	**(2.25)****	**(2.42)****	**(2.14)****	
Lagged Fund Size, Normalized		0.562			
		(0.67)			
Above-median Total Dollars Raised			0.44		
			(0.49)		
Total Dollars Raised, Normalized				-0.834	-1.094
				(0.40)	(0.55)
Sold/Total Companies Ratio					-1.888
					(0.27)
Failed/Total Companies Ratio					-2.633
					(0.65)
Fund Vintage Year	**1.06**	**1.046**	**1.112**	**0.972**	**0.865**
	(3.49)***	**(3.28)*****	**(3.49)*****	**(3.14)*****	**(2.72)*****
Venture-firm Age When Fund Raised	-0.102	-0.083	-0.085	-0.129	-0.073
	(0.41)	(0.33)	(0.33)	(0.54)	(0.28)
Constant	-2,070.15	-2,042.48	-2,173.75	-1,894.51	-1,682.70
	(3.40)***	(3.20)***	(3.41)***	(3.06)***	(2.64)***
Venture-firm Random Effects; Vintage-year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Funds	66	66	66	66	66
Firms	28	28	28	28	28

TABLE 9

Panel A

Predictors of fund size. The dependent variable is fund size, in millions of 2008 dollars. Independent variables include: the size of the VC's previous fund; the cumulative size of all prior funds of that VC; first dummy for above-median performance (based on ratio of sold companies (through IPO, acquisitions, mergers, buyouts) to total companies funded by this firm in all prior funds); second dummy for above-median performance funds (based on similar ratio of IPOs to total companies funded); date of VC firm formation; and fund vintage year. The sample is as follows: in Columns (1) through (4), all pre-1997 funds in VentureXpert database; in Column (5), funds #1 through #5 by VCs who raised a total of more than five funds (that is, early funds by VCs who survived for a long time); in Column (6), funds #1 through #5 for VCs who raised fewer than 5 funds; in Column (7), funds #6 through #10 (late funds for long-lived VCs). All regressions are OLS with venture-firm fixed effects, vintage-year fixed effects, venture-firm clusters, and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

	All VC Funds	All VC Funds	All VC Funds	All VC Funds	Funds 1–5 if VC Has > 5 Funds	Funds 1–5 if VC Has < 5 Funds	Funds > 5
Dependent Variable	Fund Size, $Million						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lag Fund Size	**0.31**	0.137	0.155	**0.312**	**0.458**	-0.059	-0.137
	(1.69)*	(1.25)	(1.21)	**(1.68)***	**(1.83)***	(0.15)	(1.39)
Above-median Sold/Total	**85.907**	**114.868**	**57.876**	**83.09**	**82.038**	-15.57	11.9
	(2.00)**	**(2.31)****	**(2.08)****	**(1.97)****	**(2.03)****	(0.44)	(0.21)
Above-median Failed/Total	-101.078	-165.09	-93.479	-101.40	-131.51	21.699	-78.533
	(1.28)	(1.43)	(1.30)	(1.28)	(1.51)	(1.51)	(1.48)
Two-fund Lag Fund Size		-0.036					
		(0.40)					
Total Dollars Raised Before		**0.178**	**0.17**				
		(4.89)***	**(3.59)*****				
Above-median Total Dollars Raised	-46.44						
	(1.54)						
Venture-firm Age When Fund Raised	**8.683**	11.049	1.198	**7.972**	**6.51**	0.572	**14.983**
	(2.08)**	(1.61)	(0.23)	**(2.03)****	**(1.72)***	(0.18)	**(5.68)*****
Constant	-17055.9	-21908.3	-2255.5	-15681.6	-12799.8	-1038.4	-29338.7
	(2.06)**	(1.60)	(0.22)	(2.00)**	(1.70)*	(0.16)	(5.62)***
Observations	41713	27682	41713	41713	23832	12797	5084
Venture-firm FE and Clusters; Vintage-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Venture Firms	550	285	550	550	174	376	36
R-squared	0.45	0.59	0.53	0.45	0.53	0.36	0.62

Panel B

Predictors of changes in fund size. The dependent variable is the change in fund size (size of fund (*N*) minus size of an immediately preceding fund (*N-1*)), all in millions of 2008 dollars. Independent variables include: total dollars raised before fund (N) minus total dollars raised before fund (*N-1*); size of fund (*N-1*) minus size of fund (*N-2*); fund number; IPO/total ratio in fund (*N*) minus IPO/total ratio in fund (*N-1*); sold/total ratio in fund *N* minus sold/total ratio in fund (*N-1*); fund vintage year. The sample includes all pre-1997 stand-alone venture funds in VentureXpert database. All regressions are OLS with venture-firm fixed effects, vintage-year fixed effects, venture-firm clusters, and robust standard errors. The *t* -statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	(Size of Fund *N*) minus (Size of Fund *N-1*)				
	(1)	(2)	(3)	(4)	(5)
Change: Size of Fund *N-1* Minus Size of Fund *N-2*	**-0.409**	**-0.36**		**-0.415**	**-0.348**
	(6.42)***	**(4.31)*****		**(6.24)*****	**(4.06)*****
Change: Total Dollars Raised before Fund *N* Minus Same Before Fund *N-1*		-0.354	**-0.915**		-0.548
		(1.12)	**(5.00)*****		(1.27)
Change: Sold/All Companies before Fund *N* Minus Same before Fund *N-1*			**0.834**	1.228	1.364
			(1.75)*	(0.99)	(1.14)
Change: Fail /All Companies before Fund *N* Minus Same before Fund *N-1*			-0.278	-0.553	-0.66
			(1.02)	(1.34)	(1.38)
Fund Number	0.155	0.125	-0.06	0.114	0.067
	(1.47)	(1.20)	(0.55)	(1.08)	(0.68)
Fund Vintage Year	0.026	0.014	**0.147**	0.063	**0.076**
	(0.62)	(0.36)	**(3.73)*****	(1.41)	**(1.85)***
Constant	-52.058	-28.231	-292.448	-126.328	-150.891
	(0.63)	(0.36)	(3.74)***	(1.42)	(1.86)*
Venture-firm FE and Clusters; Vintage-year FE	Yes	Yes	Yes	Yes	Yes
Observations	22672	22672	35069	21854	21854
Venture Firms	227	227	337	202	202
R-squared	0.3	0.31	0.17	0.32	0.33

TABLE 10

The dependent variable is NPV of management fee over eleven-year fund life, as a percent of committed capital. Independent variables are: dummies for each management fee rule; a dummy for whether the fee formula changes in midstream of fund's existence; a dummy indicating whether the fee is based only on committed capital; normalized total dollars raised by venture firm in all prior funds; VC firm age in the year when fund is raised; normalized fund size; and normalized fund number. In Columns (1) through (3), the omitted category is Rule 9 (increasing percentage, then, declining percentage, plus change in base from committed to managed capital). All regressions are OLS with venture-firm random effects, vintage-year fixed effects, and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	NPV Management Fee over Eleven Years, Percentage Committed Capital				
	(1)	(2)	(3)	(4)	(5)
Rule 1 Dummy (Constant Percent; Committed Capital)	**5.741** **(8.82)*****	**6.119** **(9.93)*****	**5.855** **(9.19)*****		
Rule 2 Dummy (Declining Percent; Committed Capital)	**4.718** **(4.35)*****	**5.24** **(4.92)*****	**4.85** **(3.93)*****		
Rule 3 Dummy (Increasing Percent, Declining Percent; Committed Capital)	2.295 (1.17)	3.4 (1.51)	2.147 (0.70)		
Rule 4 Dummy (Constant Percent; Declining Portion of Committed Capital Base)	**8.707** **(3.82)*****	**7.929** **(3.45)*****	**7.936** **(3.29)*****		
Rule 5 Dummy (Constant Percent; Switch Base Committed to Managed)	-1.561 (0.74)	-1.062 (0.46)	-1.149 (0.52)		
Rule 6 Dummy (Increasing Percent; Switch Base Committed to Managed)	0.15 (0.10)	-0.513 (0.46)	-0.025 (0.01)		
Rule 7 Dummy (Declining Percent; Switch Base Committed to Managed)	0.204 (0.38)	0.282 (0.60)	0.172 (0.32)		
Rule 8 Dummy (Increasing Percent, Declining Percent; Managed Capital)	**-7.805** **(11.48)*****	**-9.145** **(5.94)*****	**-7.57** **(11.01)*****		
Formula Changes in Midstream, Dummy				**-3.366** **(2.90)*****	
Base is Committed Capital, Dummy					**5.751** **(9.67)*****
Total Dollars Raised by VC in All Prior Funds, Normalized		-1.319 (1.52)			
Venture-firm Age When Fund Raised		**0.098** **(1.77)***			
Fund Size, Normalized			0.666 (1.16)	0.896 (1.36)	**0.903** **(1.94)***
Fund Number, Normalized			-0.045 (0.07)	0.015 (0.02)	-0.375 (0.66)
Constant	11.494 (18.08)***	11.931 (16.01)***	10.78 (12.08)***	15.693 (9.81)***	9.675 (7.98)***
Vintage-year Fixed Effects; Venture-firm Random Effects	Yes	Yes	Yes	Yes	Yes
Funds	68	68	66	66	66
Firms	28	28	28	28	28

TABLE 11

Panel A

Ordered probit regressions estimating the degree of management fee manipulability. The dependent variable takes value of 0 when management fee is based on committed capital; 1 if fee is based on managed capital at least sometime during years 5 to 11; and 2 if fee is based on managed capital during years 5 to 11 and at least sometime during years 0 to 5. Independent variables are: carry as a percent of profits; NPV of total management fee over 11-year fund life as a percent of committed capital; total dollars raised by a VC in all prior funds; VC firm age in the year when fund is raised; a dummy indicating whether the formula for fee calculation changes in midstream of fund's existence; ratio of companies sold by the fund (through IPO, acquisition, merger, buyout) to number of companies funded by fund; and ratio of fund's failed companies (bankruptcy or defunct) to number of companies funded by fund. All regressions are ordered probit with venture-firm fixed effects, vintage-year fixed effects, and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

	"0" = management fee based on committed capital; "1" = based on managed capital at least sometime during years 5 to 11; "2" = based on managed capital at least some time in years 0 through 5, plus years 5 to 11	
Dependent Variable	(1)	(2)
Total Dollars Raised by VC in All Prior Funds, Normalized	**-0.255** **(2.39)****	**-0.276** **(1.69)***
Venture-firm Age When Fund Raised	**-0.36** **(3.13)*****	**-0.442** **(2.86)*****
Sold Companies/Total Companies Before This Fund, Normalized		-0.242 (0.17)
Failed Companies/Total Companies Before This Fund, Normalized		**0.717** **(2.18)****
Carry as Percent of Profits	-0.013 (1.40)	-0.017 (1.37)
Management Fee NPV As Percent of Committed Capital	**-0.559** **(4.52)*****	**-0.536** **(3.72)*****
Fee Changed in Midstream Dummy	Yes	Yes
Venture-firm Fixed Effects; Vintage-year Fixed Effects	Yes	Yes
Funds	68	68

Panel B

Logit regressions estimating the predictors of the use of classic management fee formula (constant percent of committed capital). Dependent variable equals 1 when classic formula is used and 0 otherwise. Independent variables are: fund vintage year; total dollars raised by a VC in all prior funds; ratio of companies sold by the fund (through IPO, acquisition, merger, buyout) to number of companies funded by fund; ratio of fund's failed companies (bankruptcy or defunct) to number of companies funded by fund; and VC firm age in the year when fund is raised. All regressions use venture-firm random effects, robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	"1" when management fee is flat percent of committed capital; "0" otherwise	
	(1)	(2)
Vintage Year	**0.775** **(2.23)****	**0.994** **(2.52)****
Total Dollars Raised by VC in All Prior Funds, Normalized	4.097 (0.96)	0.315 (0.10)
Venture-firm Age When Fund Raised	-0.038 (0.20)	-0.032 (0.15)
Sold Companies/Total Companies in Prior Funds, Normalized		-24.956 (1.28)
Failed Companies/Total Companies in Prior Funds, Normalized		0.835 (0.16)
Constant	**-1,562.95** **(2.24)****	**-1,998.06** **(2.53)****
Venture-firm Random Effects	Yes	Yes
Observations	68	66
Venture Firms	28	28

TABLE 12

Panel A

Estimating income-smoothing within funds. Dependent variable is the ratio of the management fee that a VC earns during the first five years of a fund's life over the fee during the entire fund's life (eleven years). Management fee is measured as percent of committed capital. Independent variables include: total dollars raised by the VC firm before this fund; fund vintage year; the ratio of sold companies (IPO, acquisitions, mergers, buyouts) to number of companies funded by this fund; the ratio of failed companies (bankruptcy and defunct) to number of companies funded by this fund; carry as a percent of fund's profits; NPV of management fee over eleven years, as a percent of fund's committed capital. All regressions use venture-firm random effects and robust standard errors. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 5 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	Cumulative management fee during years 1 through 5 / Cumulative management fee during years 1 through 11	
	(1)	(2)
Total Dollars Raised by VC in All Prior Funds, Normalized	**-0.04**	**-0.047**
	(2.49)**	**(3.49)*****
Fund Vintage Year	-0.001	0.001
	(0.73)	(0.23)
Sold Companies/Total Companies in Prior Funds, Normalized		-0.173
		(1.41)
Failed Companies/Total Companies in Prior Funds, Normalized		0.045
		(1.08)
Carry As Percent of Profits	0.003	0.002
	(1.41)	(1.12)
Management Fee NPV As Percent of Committed Capital	**-0.022**	**-0.020**
	(7.11)***	**(7.37)*****
Constant	0.931	0.964
	(13.71)***	(14.06)***
Venture-firm Fixed Effects; Vintage-year Fixed Effects	Yes	Yes
Funds	68	68
Firms	28	28

Panel B

Logit regressions estimating income smoothing across funds. The dependent variable equals 1 when the fund's management fee peaks in middle years of fund's life and 0 otherwise. Independent variables include: "fundraising cycle of 4–6 years" dummy, taking value of 1 when a VC firm raises new funds each four to six years (on average) and 0 otherwise; net present value of management fee over eleven years as a percent of committed capital; fund vintage year; fund size; the ratio of IPOs to number of companies funded by this fund; the ratio of failed companies (bankruptcy and defunct) to number of companies funded by this fund; carry as a percent of fund's profits; and total dollars raised by the VC firm before this fund. All regressions use venture firm random effects and robust standard errors. The coefficient of interest is that on the "fundraising cycle" dummy. The *t*-statistics are reported under regression coefficients. *, **, *** indicate significance at 10 percent, 5 percent, and 1 percent levels. Significant results (at 10 percent level or better) are in **boldface** for variables of interest.

Dependent Variable	"1" when management fee peaks in midyears of fund's life; "0" otherwise		
	(1)	(2)	(3)
Fundraising Cycle of 4–6 Years Dummy	**16.024**	**13.571**	**18.955**
	(3.45)***	**(2.26)****	**(2.73)*****
Total Dollars Raised by VC in All Prior Funds, Normalized	3.829	**8.647**	**9.756**
	(1.23)	**(2.16)****	**(2.16)****
Fund Vintage Year	**1.439**	**1.827**	**2.624**
	(2.70)***	**(1.87)***	**(2.43)****
Carry As Percent of Profits		-0.711	**-1.175**
		(1.20)	**(1.76)***
Management Fee NPV As Percent of Committed Capital		**-1.551**	**-2.099**
		(2.48)**	**(3.00)*****
Sold Companies/Total Companies in Prior Funds, Normalized			**-30.286**
			(1.67)*
Failed Companies/Total Companies in Prior Funds, Normalized			-0.264
			(0.03)
Constant	-2,893.65	-3,630.53	-5,214.63
	(2.71)***	(1.87)*	(2.42)**
Venture-firm Random Effects	Yes	Yes	Yes
Observations	68	68	68
VC Firms	28	28	28

APPENDIX

ASSUMED SCHEDULE OF INVESTMENTS AND DISTRIBUTIONS FOR MANAGEMENT FEE BASED ON MANAGED CAPITAL

To compute the NPV of management fees, I assume a 7 percent discount rate and an eleven-year life for the fund. For funds that use a fee based on managed capital, I assume the schedule of investments and distributions set forth below. The schedule is the average for a 1992 fund.

Year	Managed capital, as percent of committed capital
1	10
2	35
3	50
4	75
5	65
6	55
7	40
8	35
9	15
10	10
11	5

Source: Sand Hill Econometrics.