

Private Equity in the 21st Century:
Cash Flows, Performance, and Contract Terms
from 1984-2010

by

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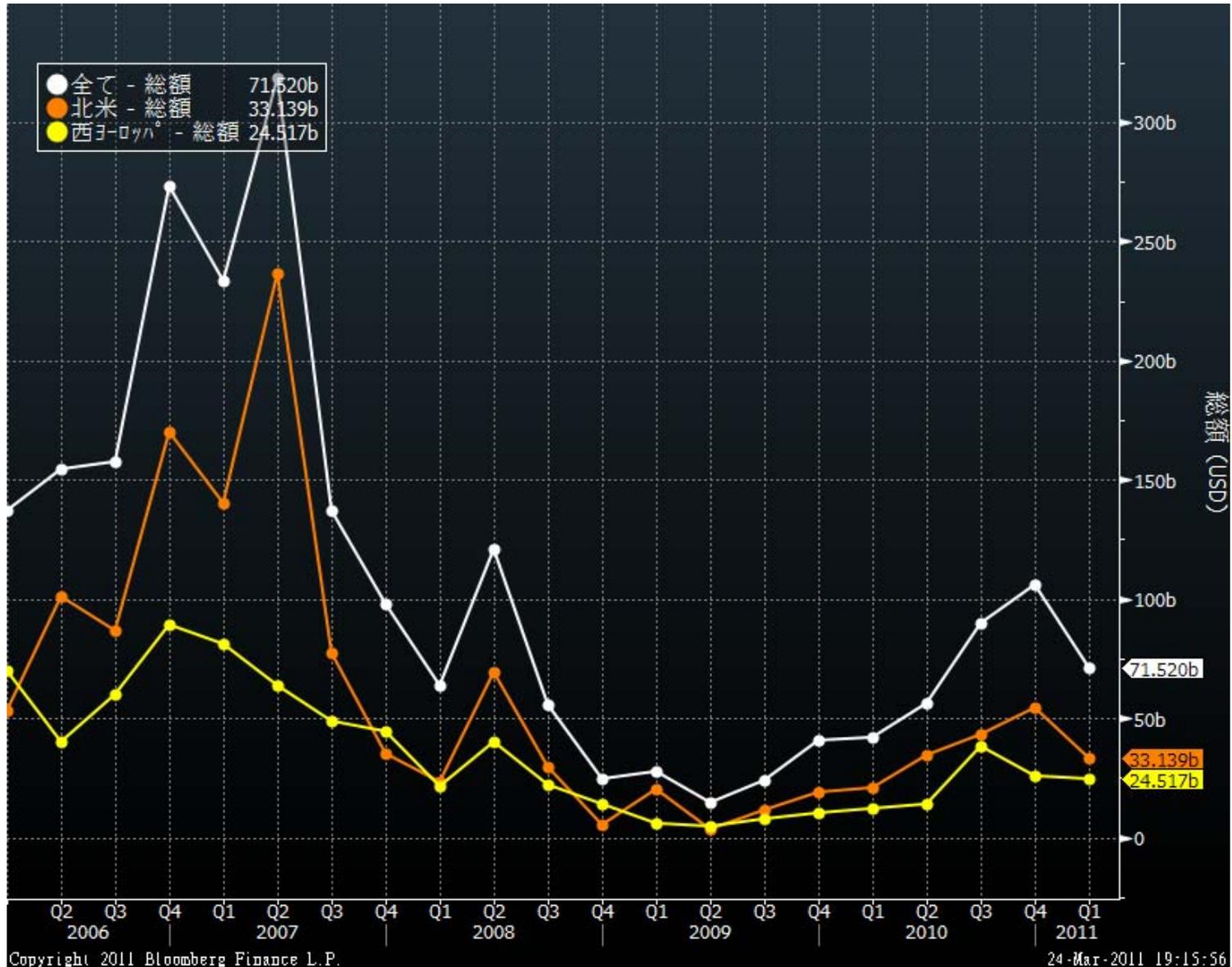
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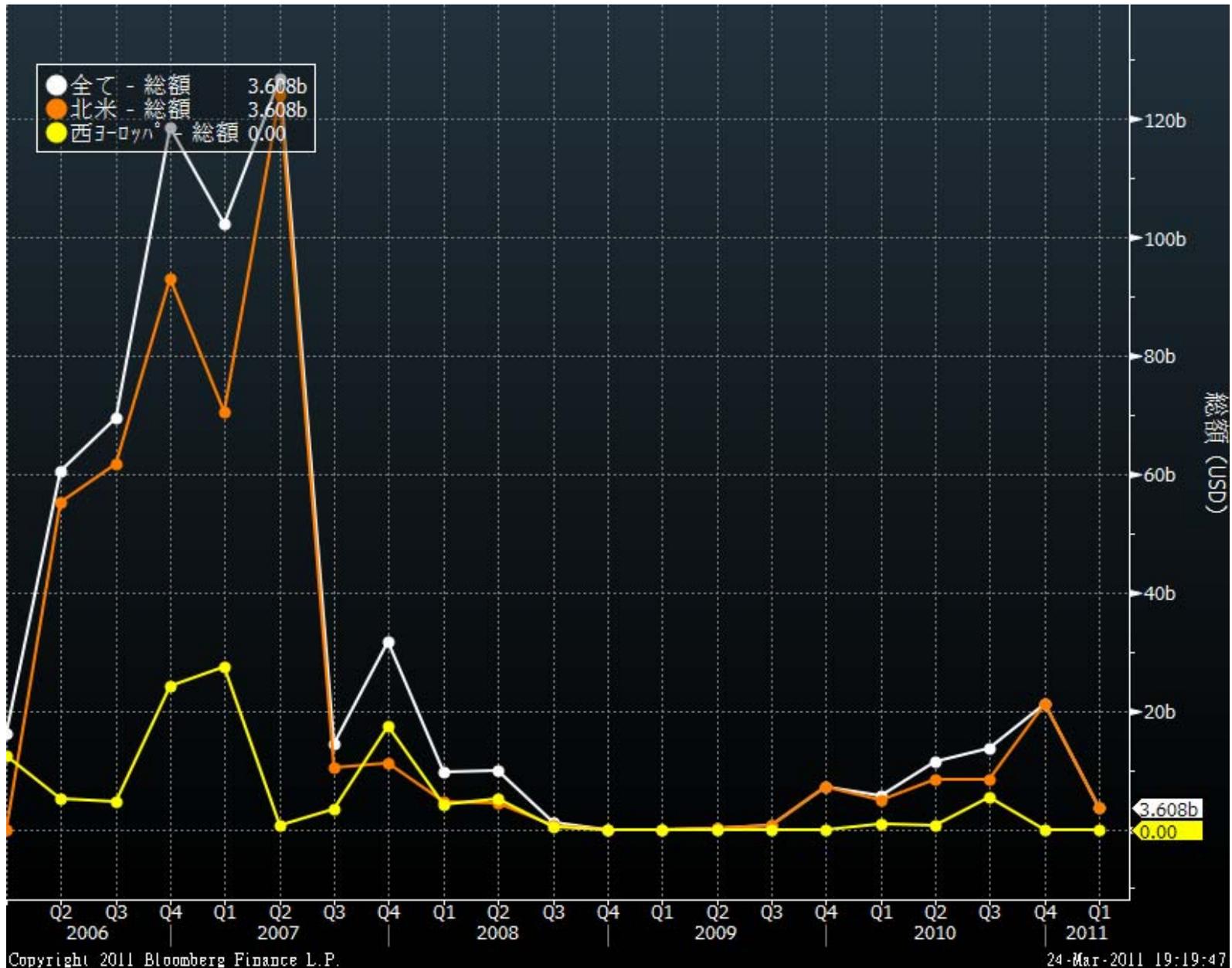
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I. Introduction

Private Equity: M&A (\$)



LBO (\$)



JACFでのKaplanの議論

2008~09年あたりの議論:

2006~07年のブームに比較すると良くないが大丈夫。

PEは他の資産と低い相関を持ちつつ高い収益を出しており
独立の資産クラスになったとあって良い。

下の方は確かにだめだが、トップのPEFは高い収益率を
上げているのでこれからもOK。

PEFは永遠に不滅です！

論文の目的

Empirically investigate the following:

- (1) Impact of market conditions on private equity markets?
- (2) Management contracts and net-of-fee performance?

目的(続き (1)について)

- Do private equity funds grow too large during booms, resulting in worse performance?
- How do private equity cash flows co-move with public markets?
- What are the liquidity properties of private equity as an asset class?

目的 ((2)について)

- How do fundraising cycles affect the terms of the management contract between GPs and LPs?
- Relation of contract terms to reputation or perceived ability of the GP?
- Is greater incentive pay associated with higher performance?

関連研究 (1)

- Kaplan and Schoar (2005) and Phalippou and Gottschalg (2009) use cash flow data from VE to assess the performance of private equity funds.
- Jones and Rhodes-Kropf (2003) use VE data to investigate whether the idiosyncratic risk of private equity funds translates into higher returns.
- Ljungqvist, Richardson, and Wolfenzon (2007) use a different sample of private equity funds for which they have data on cash flows to and from portfolio companies as well as to and from LPs.

関連研究 (2)

- In all of these papers, the cash flow data does not extend beyond 2003, and is largely limited to funds with vintage years prior to 1995, nor does the data connect to features of management contracts.

関連研究 (3)

- Gompers and Lerner (1999) examine 419 VC funds raised between 1979-1992, a period with which our sample shares little overlap, and find that VCs with better reputations obtain higher carried interest and lower management fees, and that compensation terms are unrelated to performance measured by the fraction of portfolio companies that eventually go public.
- Metrick and Yasuda (2010) estimate the expected revenue to GPs in a simulation framework using data on the compensation terms of the management contracts for 238 venture capital and buyout funds. Their data do not include any performance information.

Data

- A large, **proprietary** database of private equity funds
- From 1984 to 2010.
- Provided by a large, (anonymous) institutional limited partner with extensive investments in venture capital, buyout, real estate, distressed debt, and fund-of-fund private equity funds.
- Complete information on the quarterly cash flows to and from the funds and their investors, extending through the second quarter of 2010.

Data (続き)

- Key terms of the management contract between the LPs and GPs, including the management fees and carried interest that the GPs earn as compensation and the GPs' own investment in the fund.
- The dataset is the 1st available for academic research to include cash flow information for a large sample of private equity funds extending beyond 2003, to include information on GP capital commitments, and to combine cash flow information with the terms of the management contracts.

Data (続き)

- Selection bias?
- Coming directly from the LP's internal accounting system. Free from the reporting and survivorship biases.
- Data provider's overall portfolio was assembled over time as it acquired other institutions for reasons unrelated to each company's private equity exposure.

Data (続き)

- The dataset is large relative to the universe of U.S. private equity.
 - Over 50% of the Venture Economics (VE) universe of capital committed to U.S. buyout funds
 - Almost 40% of the overall VE U.S. private equity universe, during our sample period.
- Our coverage of venture capital, distressed debt funds, and funds-of-funds is significantly less comprehensive than our buyout and real estate coverage.
 - Break out much of our analysis by fund type.

結果：(1)について－1

- Kaplan and Schoar (2005)'s public market equivalents (PMEs) to measure the performance of private equity relative to that of the S&P 500.
- On average, the sample funds have PMEs of about 1.15, meaning they have outperformed the S&P 500 on a net-of-fee basis by about 15% over the life of the fund.
- Buyout funds, where data coverage is greatest, in every vintage year since 1992 have outperformed the S&P, often by more than 25%. (excess performance of around 1.5-2.5% per annum.)

結果：(1)について－2

- These estimates are considerably higher than those in the earlier sample period studied by Kaplan and Schoar (2005) and Phalippou and Gottschalg (2009) using VE data for funds with vintage years prior to 1995 and cash flows through 2003.
- For the sample that overlaps with Kaplan and Schoar's (2005), we find PME's that are similar to theirs.
- We also find significant differences in performance across fund types. Notably, VC funds underperform buyout funds in both IRR and PME terms.

結果：(1)について－3

- Private equity returns vary considerably over time.
- Periods of high private equity fundraising, which generally coincide with high public market valuations, are followed by low absolute private equity returns (i.e., low IRRs), particularly among the largest funds and consistent with Kaplan and Stromberg (2009).
- However, funds raised in hot markets do not underperform relative to the S&P 500. That is, times of high fundraising are not generally followed by low PMEs.

結果：(1)について－4

- There is a correlation between private equity cash flows and public market returns.
 - Capital calls and distributions are both more likely and larger when public equity valuations rise, but distributions are more sensitive to public markets than calls are.
- => a positive correlation between public and private equity returns.

結果：(1)について－5

- Net cash flows are procyclical and private equity funds are liquidity providers (resp. sinks) when public market valuations are high (resp. low).
- Private equity is not a liquidity sink, except during the financial crisis and ensuing recession of 2007-2009.

結果：(2)についてー1

- Market conditions is connected to changes in contract terms over time.
- On average, most funds charge an annual management fee of 1.5%, 2%, or 2.5%, and a carried interest of 20%.
- During fundraising booms, the average fund size grows, and management fees increase. Carried interest does not move cyclically.

結果：(2)について－2

- GP compensation rises and shifts to fixed components during booms.
- As Kaplan and Schoar (2005) and others argue that higher-ability GPs raise larger funds, we find that carried interest and capital commitments are both higher in larger funds, while management fees are lower.

結果：(2)について－3

- Although compensation terms are related to both market conditions and proxies for GP ability, they are unrelated to net-of-fee performance, both in the cross-section and over time.
- This result contrasts with the strongly negative relation between fees and net-of-fee performance in the mutual fund industry (e.g., Carhart, 1997; Fama and French, 2010).

結果：(2)について－3

- GPs who receive higher compensation earn back their pay by generating higher gross-of-fee performance: consistent with an optimal contracting equilibrium
- Hot fundraising markets are associated with higher GP compensation but are not followed by worse PME's,

=> funds raised in hot markets deliver higher gross-of-fee performance relative to the S&P 500 compared to funds raised in cold markets.

結果：(2)について－4

- In the cross-section, the results suggest that a limited supply of higher ability GPs raise larger funds, receive greater incentive pay and fractional ownership, and earn back their total compensation by generating higher gross-of-fee performance.

II. Data

Data Overview

Table 1: Data Overview and Variable Definitions

This table provides definitions to some common terms used for describing the management and performance characteristics of private equity funds. In the typical fund, limited partners (LPs) are passive investors whose investments are managed by general partners in the fund (GPs). The management agreement is typically specifies that the GPs earn a combination of management fee and carried interest, as described below.

Fund characteristics (990 funds in total)

<u>Variable</u>	<u>Definition</u>
Sequence number	The position of the fund in the partnership's sequence of funds.
Fund size	The total amount of capital committed to the fund, including commitments by both LPs and general partners GPs.
GP commitment	The percentage of fund size committed by the GP.
Management fee	The annual management fee earned by the GP, typically expressed as an annual percentage of funds committed (fund size) or invested (invested capital). In many cases this fee varies over time depending on how fully committed the fund's capital is.
Carried Interest	The percentage of fund profits that the GP keeps as compensation. Carried interest (also known as <i>carry</i>) is paid in addition to the management fee.

Cash flow and market value variables (41,238 quarterly observations through 6/30/2010)

<u>Variable</u>	<u>Definition</u>
Capital calls	LPs must contribute capital to the fund when called by the GP (rather than all at once), until their commitment is exhausted. Capital calls can include calls for management fees.
Distributions	When investments are realized, the proceeds (net of carry) are distributed to LPs.
Market value	The GP's assessment of the market value of unrealized investments.

- Fund characteristics (990 funds in total)
- Cash flow and market value variables (41,238 quarterly observations through 6/30/2010)

- Fund size:
The total amount of capital committed to the fund.
- GP commitment:
The percentage of fund size committed by the GP.
- Management fee:
The annual management fee earned by the GP, typically expressed as an annual percentage of funds committed (fund size) or invested (invested capital).
- Carried Interest:
The percentage of fund profits that the GP keeps as compensation.

- Capital calls:

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- Distributions:

When investments are realized, the proceeds (net of carry) are distributed to LPs.
- Market value:

The GP's assessment of the market value of unrealized investments.

PE Fund Characteristics:

Table 2: The Characteristics of Private Equity Funds

This table presents summary statistics for private equity funds in our sample, including venture capital (VC), buyout (BO), real estate (RE), debt (Debt), and funds of funds (FoF). Fraction of 1st, 2nd, and 3rd funds indicates the fraction of sample funds of that sequence number (position in a partnership's sequence of funds). Total Committed Capital is the aggregate amount of capital committed to our sample funds (i.e. the sum of the sizes of all sample funds). Total LP Capital and Total GP Capital indicate, respectively, the contributions of limited partners and general partners to this total. The % of VE universe is the total committed capital of the sample funds of a given fund type expressed as a percentage of the total committed capital to all funds of the same type reported on Venture Economics over the entire 1984-2009 sample period. The % of VE U.S. universe is the same but includes only U.S. sample funds and U.S. funds on VE. Fund Size is the committed capital of the fund. All dollar amounts are in millions of US dollars. Funds in the liquidated sample are those that had vintage years prior to 2006 and were liquidated as of 6/30/2010.

	All	VC	BO	RE	Debt	FoF
<u>Full Sample:</u>						
Number of Funds	990	295	542	73	43	37
Fraction of 1st Funds	0.31	0.25	0.32	0.30	0.65	0.22
Fraction of 2nd Funds	0.23	0.26	0.23	0.15	0.19	0.24
Fraction of 3rd Funds	0.16	0.15	0.16	0.14	0.14	0.19
Total Committed Capital	\$677,557	\$61,358	\$535,485	\$64,201	\$9,088	\$7,432
Total LP Capital	\$663,340	\$60,469	\$525,276	\$61,428	\$8,803	\$7,362
Total GP Capital	\$14,217	\$879	\$10,209	\$2,773	\$285	\$70
% of VE universe	30.1%	10.8%	41.6%	64.0%	9.4%	3.7%
% of VE U.S. universe	39.0%	15.9%	55.7%	65.9%	9.4%	5.0%
Mean Fund Size	\$684.40	\$207.96	\$987.98	\$879.48	\$211.36	\$200.88
Median Fund Size	\$217.09	\$106.12	\$312.91	\$505.00	\$154.05	\$149.50
St. Dev. Fund Size	\$1783.73	\$276.26	\$2291.21	\$1407.26	\$219.17	\$212.48
<u>Liquidated Sample:</u>						
Number of Funds	632	192	368	35	28	9
Fraction of 1st Funds	0.35	0.28	0.35	0.40	0.64	0.33
Fraction of 2nd Funds	0.23	0.23	0.23	0.20	0.21	0.44
Fraction of 3rd Funds	0.15	0.18	0.15	0.09	0.14	0.00
Total Committed Capital	\$335,221	\$37,126	\$271,183	\$20,806	\$5,297	\$806
Total LP Capital	\$327,517	\$36,609	\$265,556	\$19,383	\$5,166	\$800
Total GP Capital	\$7,704	\$517	\$5,627	\$1,423	\$131	\$6
Mean Fund Size	\$530.41	\$193.37	\$736.91	\$594.47	\$189.21	\$ 89.62
Median Fund Size	\$175.00	\$ 83.46	\$266.72	\$408.70	\$136.77	\$ 58.00
St. Dev. Fund Size	\$1166.47	\$284.51	\$1467.87	\$490.55	\$234.85	\$ 67.77

- Only \$61 billion in committed venture capital, or 16% of the VE universe of U.S. funds, while the real estate fund sample comprises over 65% of the U.S. VE universe.
- 542 buyout funds, for a total capitalization of \$535 billion, representing 56% of the total capitalization of the VE U.S. buyout universe over the 1984-2010 sample period.
- “Liquidated Sample”
 - Sample of funds that were either officially liquidated as of 6/30/2010, or had no cash flow activity for the last six quarters of the sample and had vintage years prior to 2006.
 - => Forms the basis of much of our performance assessment based on actual cash flows.

GP compensation & cap. commitments (Full sample)

Table 3: Summary Statistics on GP Compensation and Capital Commitments

Panel A contains summary statistics on initial management fees, carried interest and GP capital commitments (expressed as a percentage of fund size) for the full sample of 990 funds. Panel B contains the same information for the sample of liquidated funds, those with vintage years prior to 2006 that were either officially liquidated by 6/30/2010 or had no cash flow activity for the six calendar quarters ending on 6/30/2010.

Panel A: Full Sample	All	VC	BO	RE	Debt	FoF
<u>Initial Management Fee:</u>						
Mean Initial Fee (% per year)	1.85	2.24	1.78	1.33	1.54	1.16
Median Initial Fee (% per year)	2.00	2.50	2.00	1.50	1.50	1.25
St. Dev. Initial Fee (% per year)	0.53	0.43	0.44	0.40	0.52	0.45
Fraction with:						
Initial Fee = 1.5%	0.23	0.05	0.25	0.65	0.50	0.12
Initial Fee = 2.0%	0.34	0.27	0.45	0.03	0.18	0.00
Initial Fee = 2.5%	0.18	0.47	0.07	0.02	0.00	0.00
Initial Fee Basis = Committed Capital	0.88	0.91	0.90	0.75	0.76	0.69
Initial Fee Basis = Invested Capital	0.06	0.04	0.05	0.17	0.11	0.08
<u>Carried Interest:</u>						
Mean Carry (%)	20.11	20.44	19.96	20.14	20.00	19.73
Median Carry (%)	20.00	20.00	20.00	20.00	20.00	20.00
St. Dev. Carry (%)	1.42	1.70	1.33	0.82	0.00	1.64
Fraction with Carry = 20%	0.95	0.89	0.97	0.97	1.00	0.97
Fraction with Carry < 20%	0.01	0.01	0.02	0.00	0.00	0.03
Fraction with Carry > 20%	0.04	0.10	0.01	0.03	0.00	0.00
<u>GP Commitment:</u>						
Mean GP Commitment (%)	2.36	1.78	2.38	4.35	3.88	1.04
Median GP Commitment (%)	1.00	1.00	1.00	1.04	1.00	1.00
St. Dev. GP Commitment (%)	5.90	5.09	5.73	8.74	8.44	1.16
Fraction with GP % \in 0.99% - 1.01%	0.42	0.56	0.35	0.25	0.42	0.57
Fraction with GP % < 0.99%	0.22	0.18	0.23	0.23	0.26	0.32
Fraction with GP % > 1.01%	0.37	0.26	0.43	0.52	0.33	0.11

GP compensation
&
cap. commitments
(Liquidated sample)

Panel B: Liquidated Sample	All	VC	BO	RE	Debt	FoF
<u>Initial Management Fee:</u>						
Mean Initial Fee (% per year)	1.86	2.24	1.75	1.19	1.50	0.85
Median Initial Fee (% per year)	2.00	2.50	2.00	1.50	1.50	1.00
St. Dev. Initial Fee (% per year)	0.55	0.46	0.47	0.40	0.55	0.53
<u>Fraction with:</u>						
Initial Fee = 1.5%	0.22	0.05	0.27	0.54	0.46	0.00
Initial Fee = 2.0%	0.34	0.26	0.42	0.00	0.19	0.00
Initial Fee = 2.5%	0.18	0.47	0.07	0.00	0.00	0.00
Initial Fee Basis = Committed Capital	0.86	0.89	0.88	0.62	0.73	0.80
Initial Fee Basis = Invested Capital	0.07	0.05	0.07	0.19	0.12	0.00
<u>Carried Interest:</u>						
Mean Carry (%)	20.15	20.44	20.01	20.14	20.00	20.00
Median Carry (%)	20.00	20.00	20.00	20.00	20.00	20.00
St. Dev. Carry (%)	1.33	1.84	1.08	0.85	0.00	0.00
Fraction with Carry = 20%	0.94	0.88	0.97	0.97	1.00	1.00
Fraction with Carry < 20%	0.01	0.02	0.01	0.00	0.00	0.00
Fraction with Carry > 20%	0.04	0.10	0.02	0.03	0.00	0.00
<u>GP Commitment:</u>						
Mean GP Commitment (%)	2.44	1.62	2.43	6.59	3.53	0.90
Median GP Commitment (%)	1.00	1.00	1.00	1.52	1.00	0.99
St. Dev. GP Commitment (%)	6.18	2.61	6.47	11.91	8.16	1.22
Fraction with GP % \in 0.99% - 1.01%	0.43	0.57	0.37	0.23	0.43	0.44
Fraction with GP % < 0.99%	0.22	0.18	0.23	0.14	0.32	0.44
Fraction with GP % > 1.01%	0.36	0.24	0.40	0.63	0.25	0.11

- “2 and 20“ holds. Median initial management fee is two percent, while the median carry is equal to twenty percent.
- Median GP capital commitment is one percent of fund size.
- Large variation in initial management fee, both within funds of a given class as well as across fund classes.
Management fees are higher in venture than in buyout
- Relatively little cross-sectional variation in carried interest.
Variation exists in venture funds and in buyout funds.
- Considerable amount of variation in the percentage amount of GP commitments.

Comparison to Public Database

Representativeness of the data?

Table 4: Comparison to Public Databases

This table presents comparisons of our sample coverage of U.S. buyout and venture capital funds to those of publicly-available commercial databases produced by Venture Economics (VE), Prequin, and Cambridge Associates (CA). Our source for the coverage of these databases is Harris, Jenkinson, and Stucke (2010), Tables 9 and 12. Ave. IRR is the simple average IRR of all funds in a given vintage year (in percent). The exception is the CA average IRR for VC funds, which is a pooled IRR created by combining the cash flows from all funds within a vintage year. Wtd. Ave. IRR is the size-weighted average IRR by vintage year (in percent). Panel A compares buyout funds and Panel B compares venture capital funds. CA does not provide weighted-average IRRs. In Panel A, comparisons begin in 1986, the first year for which Harris et al. report the needed data. In Panel B, comparisons end in 2007 because we have no VC funds raised after 2007.

Panel A: Buyout funds											
Vintage	Number of funds				Ave. IRR				Wtd. Ave. IRR		
	Our sample	VE	Prequin	CA	Our sample	VE	Prequin	CA	Our sample	VE	Prequin
1986	1	10	6	7	13.2	18.0	18.3	15.4	13.2	20.9	21.7
1987	8	25	6	10	15.7	9.8	24.6	15.9	20.6	13.4	24.3
1988	14	14	8	11	9.3	8.7	14.6	10.8	8.7	9.7	14.0
1989	16	23	10	14	14.8	13.8	35.0	21.5	19.4	25.6	31.3
1990	7	9	10	4	21.5	5.0	21.9	16.7	27.6	11.3	22.4
1991	2	5	7	7	6.3	13.7	29.4	31.8	15.8	13.2	25.9
1992	4	15	13	6	30.5	20.0	15.3	34.4	37.3	23.9	22.1
1993	9	22	16	18	40.2	18.9	22.1	21.0	36.4	21.1	20.8
1994	24	26	21	13	22.8	14.0	22.1	13.3	25.7	15.9	24.1
1995	24	24	18	22	16.2	9.3	20.4	13.5	19.4	10.1	15.8
1996	41	26	22	25	10.2	8.3	12.2	9.1	8.3	6.6	8.2
1997	40	41	28	37	5.4	6.0	8.1	4.8	10.7	8.8	8.4
1998	59	55	44	38	4.8	5.5	6.0	7.7	3.9	1.3	2.2
1999	59	41	29	41	2.1	4.2	6.0	11.6	-4.1	7.7	6.6
2000	68	48	43	52	6.6	10.6	15.4	14.1	6.8	11.1	16.2
2001	26	27	18	12	12.0	11.3	22.0	25.5	3.6	11.1	25.8
2002	5	15	21	24	17.9	9.9	12.4	17.2	25.1	12.4	16.3
2003	8	11	20	19	37.5	9.1	15.7	13.1	48.2	17.3	26.7
2004	3	19	26	49	18.8	14.2	12.9	6.3	18.9	10.7	12.3
2005	2	20	50	44	-1.1	0.4	4.1	-0.8	-0.6	-3.9	4.8
2006	8	26	43	41	-18.3	-7.1	-6.3	-5.6	-4.6	-9.6	-7.8
2007	6	19	47	45	-17.6	-2.9	-5.5	-9.0	-14.6	-8.2	-7.4
2008	12	14	34	22	-17.7	-7.7	-7.0	-22.2	-30.3	-19.9	-8.5
Total	446	535	540	561							

Panel B: Venture capital funds											
Vintage	Number of funds				Ave. IRR				Wtd. Ave. IRR		
	Our sample	VE	Prequin	CA	Our sample	VE	Prequin	CA	Our sample	VE	Prequin
1984	6	64	14	32	10.6	5.0	13.7	8.6	10.2	6.1	12.4
1985	5	46	17	25	11.4	8.2	14.5	12.9	12.2	9.2	13
1986	3	43	16	31	-27.7	7.0	11.0	14.6	-10.1	10.2	12.8
1987	6	63	18	34	3.8	7.6	14.2	18.3	5.8	13.5	13.9
1988	9	44	21	27	12.0	12.3	22.7	21.1	15.3	19.8	24.9
1989	10	54	28	37	13.5	12.3	23.7	19.2	18.4	16.2	28.5
1990	1	22	15	15	14.9	17.5	18.9	35.2	14.9	24.4	23.3
1991	-	-	-	-	-	-	-	-	-	-	-
1992	4	28	19	24	6.8	25.2	27.3	34.8	8.5	29.1	30.7
1993	5	40	23	38	24.5	22.0	32.6	47.1	35.5	28.7	42.1
1994	7	39	23	42	61.8	25.2	32.3	55.6	62.5	32.8	48.9
1995	13	48	23	34	26.9	45.4	65.3	88.0	27.1	57.0	66.4
1996	13	36	21	41	22.7	74.1	39.1	99.3	24.2	59.2	32.3
1997	19	62	37	75	31.6	49.1	45.7	85.1	36.8	45.7	55.5
1998	36	76	32	81	12.4	25.0	24.8	12.4	18.9	23.0	26.4
1999	40	110	59	114	-10.1	-4.9	-5.3	-2.1	-22.6	-6.7	-6.2
2000	55	125	76	161	-6.6	-2.0	-1.2	-1.3	-9.4	-0.1	-1.2
2001	18	57	51	53	-8.8	0.8	-2.2	0.8	-10.4	0.8	0.8
2002	7	20	29	33	37.0	-0.6	-2.4	-0.3	7.5	-0.5	-0.1
2003	-	-	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-	-	-
2005	1	23	32	57	-5.9	0.8	-2.6	-0.9	-5.9	1.6	-0.5
2006	-	-	-	-	-	-	-	-	-	-	-
2007	2	23	41	52	-8.9	-4.2	-5.2	-4.2	-6.4	-5.8	-8.7
Total	260	1023	595	1006							

- Representativeness of the data?
- Public data: VE and Preqin + Cambridge Associates (CA).
primarily focus on venture capital and buyout funds, and performance data is fund-level IRRs or value multiples.
- Coverage of buyout funds compares well to commercial sources.
- Coverage of VC funds is less comprehensive.

- In terms of the time series, there is no significant difference between the time-series of the cross-sectional mean IRRs from our data and the VE or Preqin (nor, for buyout, CA).
- In a cross-sectional analysis, evidence that our sample of VC funds have lower IRRs than those in either VE or Preqin, but there remain no significant differences for buyout funds.
- There is no evidence that our buyout data lack representativeness.
- Our venture performance numbers are below what are commonly reported in commercially available data.

Fund size and Market condition (OLS estimates)

Table 5: Fund Size and Market Conditions

This table presents cross-sectional fund-level OLS estimates of the relation between fund size and market condition at the time the fund was raised. The dependent variable is the natural logarithm of fund size (in \$M). Industry Flows is total capital committed to all funds of the same type raised in the fund's vintage year (data from Venture Economics). Adjusted Industry Flows is Industry Flows divided by total U.S. stock market capitalization at the end of the vintage year (data from CRSP). "VC boom", "Buyout boom", and "Real Estate boom" are indicator variables for whether the fund was raised during 1997-2001, 2005-2008, or 2004-2008, respectively, the respective boom periods in fundraising activity reported by Venture Economics. Standard errors (in parentheses) are robust to heteroskedasticity and clustered by vintage year. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable = ln(Fund Size)		
	(1)	(2)	(3)
ln (Industry Flows)	0.257*** (0.040)		
ln (Adjusted Industry Flows)		0.376*** (0.061)	
VC boom × VC Fund Indicator			0.852*** (0.200)
Buyout boom × Buyout Fund Indicator			2.093*** (0.173)
Real Estate boom × RE Fund Indicator			0.839*** (0.231)
Buyout Fund Indicator	1.022*** (0.108)	1.012*** (0.101)	1.503** (0.124)
Real Estate Fund Indicator	2.068*** (0.162)	2.412*** (0.179)	1.986*** (0.135)
Debt Fund Indicator	0.868*** (0.186)	1.246*** (0.205)	
Fund-of-Funds Indicator	0.659*** (0.197)	0.893*** (0.207)	
	2.183*** (0.380)	7.062*** (0.425)	4.172*** (0.100)
Sample	All	All	VC, BO, RE
Observations	975	975	910
R-squared	0.238	0.238	0.246

- Connection between market conditions and fund size.
- Important for understanding the ultimate dollar values of GP compensation and capital commitments.
(GP compensation are typically proportional to size of assets under management.)
- Cross-sectional fund-level OLS estimates of the relation between log fund size and market conditions at the time the fund was raised.

- Industry Flows:
Natural logarithm of total capital committed to all funds of the same type raised in the fund's vintage year.
- Adjusted Industry Flows:
Industry Flows divided by the total US stock market capitalization at the end of the vintage year.
- VC boom: Indicator function of 1997-2001
Buyout boom: 2005-2008
Real estate boom: 2004-2008

- Column (1):
Average fund size grows significantly when industry fund raising is higher.

- Column (2):
Replaces Industry Flows with Adjusted Industry Flows and repeats the analysis and obtain similar results.

- Column (3):

Most dramatic scaling of average fund size occurred among buyout funds during the buyout boom of 2005-2008. Buyout funds raised during this period were essentially twice the size of buyout funds raised during non-boom periods.

VC funds and real estate funds also grew in average size during their respective boom periods, but not by nearly the same degree.

III. Performance of PE Funds

Cash Flow Based Fund Performance

Table 6: The Performance of Private Equity Funds: Cash Flow Based

We calculate IRRs and public market equivalents (PMEs) using actual fund cash flows. PME's are calculated relative to the S&P 500. The table reports cross-sectional statistics of fund-level final realized performance. The table includes only the sample of liquidated funds (those with vintage years prior to 2006 that were liquidated as of 6/30/2010; see Table 2).

	All	VC & BO	VC	BO	RE	Debt	FoF
<u>IRR (Equally weighted):</u>							
Mean	0.11	0.11	0.09	0.12	0.12	0.06	0.22
Median	0.08	0.07	0.02	0.10	0.11	0.05	0.25
Std. Deviation	0.35	0.36	0.47	0.28	0.12	0.45	0.15
25 th Percentile	-0.02	-0.03	-0.08	-0.01	0.05	-0.01	0.14
75 th Percentile	0.20	0.20	0.16	0.22	0.18	0.13	0.32
<u>PME (Equally weighted):</u>							
Mean	1.15	1.14	1.03	1.20	1.21	1.10	1.23
Median	1.02	1.01	0.81	1.10	1.22	1.01	1.07
Std. Deviation	0.78	0.81	0.95	0.71	0.41	0.68	0.43
25 th Percentile	0.72	0.69	0.52	0.81	0.93	0.69	1.02
75 th Percentile	1.43	1.42	1.13	1.46	1.55	1.21	1.45
<u>IRR (Size-weighted):</u>							
Mean	0.09	0.09	-0.07	0.12	0.12	0.06	0.24
Median	0.11	0.11	-0.03	0.13	0.10	0.12	0.25
Std. Deviation	0.26	0.27	0.41	0.24	0.11	0.24	0.12
25 th Percentile	0.01	0.00	-0.11	0.04	0.05	0.01	0.17
75 th Percentile	0.19	0.19	0.05	0.19	0.19	0.14	0.36
<u>PME (Size-weighted):</u>							
Mean	1.15	1.14	0.84	1.19	1.17	1.17	1.25
Median	1.07	1.05	0.75	1.12	1.20	1.20	1.07
Std. Deviation	0.48	0.49	0.66	0.45	0.37	0.48	0.37
25 th Percentile	0.86	0.85	0.51	0.90	0.93	0.86	1.03
75 th Percentile	1.44	1.44	0.94	1.46	1.39	1.53	1.53
N	632	560	192	368	35	28	9

- Aggregate ex-post cash flow performance of PE funds
Compare it to the performance of the S&P 500.
- Rely on liquidated funds
 - Performance are based on the actual cash flows of the fund.
- (1) IRR (quarterly fund-level cash flows)
(2) PME: public market equivalent

- PME: (Kaplan and Schoar (2005))
 - Discount all cash outflows from the fund (distributions) using the total return of the S&P 500 as the discount rate, and summing each discounted outflow to obtain the total discounted outflows from the fund. Similarly calculate the total discounted inflows (capital calls) to the fund. The ratio of the total discounted outflows to the total discounted inflows is the PME, and reflects the net-of-fee return to private equity investments relative to public
- $PME = 1.0$ means that the LP would have received exactly the same total return had she, instead of investing in the private equity fund, invested all capital calls in the S&P 500.

- Average (median) equal-weighted fund IRRs are
 - 11% (8%) for all funds,
 - 9% (2%) for VC funds,
 - 12% (10%) for buyout funds,
 - 12% (11%) for real estate funds,
 - 6% (5%) for debt funds,
 - 22% (25%) for funds-of-funds.
- On an IRR basis, the funds in this sample underperform those in the older sample (consisting of funds started before 1995) studied by Kaplan and Schoar (2005), where aggregate average (median) IRRs of 17% (11%) for VC funds and 19% (13%) for buyout funds.

- PME's conclusion reverses. Average (median) PME is 1.03 (0.81) for VC funds
1.20 (1.10) for buyout funds,
substantially greater than the PMEs of 0.96 (0.66) for VC funds and 0.97 (0.80) for buyout funds in Kaplan and Schoar's sample.
- The more recent private equity funds in our sample have on average beaten the S&P 500 over the sample period, even net of fees.
- Similar PMEs as Kaplan and Schoar (2005) do when considering only their sample period.

- Wide dispersion in the returns of individual funds, VC funds display the most dispersion measured by the within-type standard deviation of PME.
- Size (committed capital)-weighted IRR and PME are similar.
- Size-weighted performance is lower than equal-weighted performance. This is particularly true for VC funds.
- These findings suggest that Kaplan and Schoar's (2005) finding that larger funds outperform smaller ones has weakened over time.

- VC funds, as a group, have lower returns than other types of funds over the sample period.
- This contrasts with Kaplan and Schoar (2005), who find that VC funds outperform buyout funds on a size-weighted, PME basis.
- This reflects the poor returns of VC funds, particularly of large VC funds, started in response to the capital inflows following the technology boom of the late 1990s, which Kaplan and Schoar's (2005) sample period does not cover.

- The large extent of time-series variation.
- Sharp decline in the returns of VC funds started between 1999-2002 compared to earlier in the 1990s.
- Higher returns (?) to buyout and real estate funds started in 2002-2004, a period that represents the fundraising trough following the recession of 2002 and the beginning of the buyout and real estate booms of the mid-2000s.

IV. Behavior of PE Performance and Cash Flows over Time

- How market conditions impact the performance and cash flow behavior of private equity funds?
 1. Large differences in the relation between performance and capital flows to private equity funds based on whether we measure performance with IRRs or PMEs.
 2. Examine the co-movement of call and distribution behavior with macroeconomic variables.

- How are private equity fundraising conditions related to future performance?
- Cross-sectional regressions of **final fund performance** on **market conditions** at the time the fund was initiated.
- Key Independent variables:
 - In (Industry Flows)
 - Adjusted Industry Flows
- Kaplan and Stromberg (2009) found a negative relation between buyout fund IRRs and Adjusted Industry Flows using data from VE.

Table 8: Fund Performance and Market Conditions

Fund Performance and Market Conditions (OLS)

Panel A: All Funds								
	Flows = ln(Industry Flows)				Flows = Adjusted Industry Flows			
	IRR	PME	IRR	PME	IRR	PME	IRR	PME
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flows	-0.030*** (0.010)	0.018 (0.020)			-0.320*** (0.066)	-0.104 (0.175)		
Flows×Size Q1			-0.019 (0.012)	0.063** (0.026)			-0.176* (0.101)	0.471 (0.322)
Flows×Size Q2			-0.021 (0.013)	0.022 (0.021)			-0.327*** (0.085)	-0.045 (0.213)
Flows×Size Q3			-0.057*** (0.015)	-0.045* (0.026)			-0.392*** (0.121)	-0.485** (0.201)
Observations	621	621	621	621	621	621	621	621
R-squared	0.037	0.017	0.051	0.034	0.047	0.017	0.056	0.032

Panel B: VC Funds								
	Flows = ln(Industry Flows)				Flows = Adjusted Industry Flows			
	IRR	PME	IRR	PME	IRR	PME	IRR	PME
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flows	-0.037** (0.017)	-0.017 (0.039)			-0.432*** (0.114)	-0.535*** (0.162)		
Flows×Size Q1			-0.011 (0.018)	0.051 (0.044)			-0.210* (0.114)	-0.058 (0.360)
Flows×Size Q2			-0.016 (0.029)	0.016 (0.056)			-0.458*** (0.117)	-0.485* (0.275)
Flows×Size Q3			-0.117** (0.054)	-0.206* (0.115)			-0.411 (0.259)	-0.677 (0.510)
Observations	191	191	191	191	191	191	191	191
R-squared	0.034	0.001	0.102	0.049	0.076	0.023	0.117	0.042

Panel C: Buyout Funds								
	Flows = ln(Industry Flows)				Flows = Adjusted Industry Flows			
	IRR	PME	IRR	PME	IRR	PME	IRR	PME
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Flows	-0.025*** (0.009)	0.036* (0.018)			-0.202** (0.074)	0.342 (0.201)		
Flows×Size Q1			-0.019 (0.016)	0.081** (0.036)			-0.094 (0.154)	1.097*** (0.307)
Flows×Size Q2			-0.026** (0.010)	0.017 (0.018)			-0.287** (0.109)	0.176 (0.217)
Flows×Size Q3			-0.034* (0.017)	-0.003 (0.032)			-0.218 (0.148)	-0.210 (0.279)
Observations	368	368	368	368	368	368	368	368
R-squared	0.024	0.008	0.026	0.018	0.015	0.007	0.018	0.027

- Equally weighted performance measures; IRR and PME
 - For IRR, there is a **negative** and highly statistically significant relation between industry flows and performance.
 - Funds that are initiated in boom years have low performance, if measured by IRR.
 - For PME, there is no relation at all between capital raising and performance.
- => Relative to the public market, private equity performance is no different in high fundraising years than in low fundraising years.

- Negative relation between industry flows and subsequent IRRs is predominantly driven by the tendency of larger funds raised in peak fundraising years to deliver low IRRs going forward. (Flows \times Size Q3)
- However, when we switch to relative performance PME's, the fund-flow/size/performance interaction largely vanishes.
- At least part of the absolute underperformance of the largest funds in each asset class is driven by the fact that the peaks in the private equity market are highly correlated with peaks in the overall economy.

- Periods of high fundraising activity do not necessarily imply that returns going forward will be low.
- The periods of high fundraising activity presage broader market downturns.

Table 9: Capital Calls and Macroeconomic Conditions

Market conditions
and capital calls

(1)-(5) OLS

(6)-(9) Tobit

Panel A: Sample includes all funds									
	Models (1)-(5): DV = Capital Call Occurs				Models (6)-(9): DV = ln(1 + % Called)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(P/D)		0.082*** (0.020)	0.089*** (0.020)		0.094*** (0.020)	0.365*** (0.122)	0.448*** (0.114)		0.439*** (0.124)
ln(TED)		0.032*** (0.010)	0.033*** (0.009)		0.049*** (0.010)	0.219*** (0.056)	0.223*** (0.050)		0.289*** (0.059)
ln(% Uncalled)			0.059*** (0.007)		0.065*** (0.006)		0.359*** (0.025)		0.376*** (0.024)
Crisis Indicator				-0.023* (0.014)	0.721*** (0.150)			-0.054 (0.068)	2.299*** (0.772)
Crisis×ln(P/D)					-0.165*** (0.041)				-0.514** (0.201)
Crisis×ln(TED)					-0.030* (0.015)				-0.122 (0.081)
Crisis×ln(% Uncalled)					-0.066*** (0.010)				-0.262*** (0.052)
Observations	25,410	25,379	25,379	25,410	25,379	25,379	25,379	25,410	25,379
R-squared	0.176	0.163	0.171	0.160	0.173	0.090	0.097	0.088	0.098

Panel B: Sample includes only VC funds									
	Models (1)-(5): DV = Capital Call Occurs				Models (6)-(9): DV = ln(1 + % Called)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(P/D)		0.121*** (0.036)	0.117*** (0.035)		0.114*** (0.037)	0.561** (0.261)	0.684*** (0.237)		0.682*** (0.255)
ln(TED)		0.064*** (0.016)	0.061*** (0.014)		0.079*** (0.019)	0.416*** (0.099)	0.388*** (0.089)		0.445*** (0.111)
ln(% Uncalled)			0.085*** (0.010)		0.091*** (0.010)		0.508*** (0.048)		0.530*** (0.050)
Crisis Indicator				0.006 (0.017)	0.406* (0.215)			0.131 (0.125)	2.914* (1.592)
Crisis×ln(P/D)					-0.091 (0.055)				-0.659* (0.395)
Crisis×ln(TED)					-0.024 (0.024)				-0.087 (0.145)
Crisis×ln(% Uncalled)					-0.066*** (0.012)				-0.312*** (0.087)
Observations	7,345	7,328	7,328	7,345	7,328	7,328	7,328	7,345	7,328
R-squared	0.189	0.151	0.165	0.144	0.167	0.081	0.090	0.076	0.090

Panel C: Sample includes only Buyout funds									
	Models (1)-(5): DV = Capital Call Occurs				Models (6)-(9): DV = ln(1 + % Called)				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(P/D)		0.096*** (0.020)	0.105*** (0.019)		0.115*** (0.018)	0.360*** (0.114)	0.426*** (0.108)		0.432*** (0.119)
ln(TED)		0.011 (0.008)	0.013 (0.008)		0.025*** (0.009)	0.141*** (0.049)	0.153*** (0.044)		0.201*** (0.053)
ln(% Uncalled)			0.059*** (0.007)		0.064*** (0.007)		0.327*** (0.025)		0.339*** (0.024)
Crisis Indicator				-0.047*** (0.017)	0.995*** (0.118)			-0.126* (0.072)	2.944*** (0.624)
Crisis×ln(P/D)					-0.234*** (0.034)				-0.692*** (0.158)
Crisis×ln(TED)					-0.020 (0.013)				-0.076 (0.067)
Crisis×ln(% Uncalled)					-0.061*** (0.012)				-0.208*** (0.058)
Observations	14,628	14,614	14,614	14,628	14,614	14,614	14,614	14,628	14,614
R-squared	0.184	0.172	0.180	0.170	0.182	0.097	0.104	0.096	0.105

- Understanding how market conditions impact the timing of cash flows in and out of private equity is critical for understanding the performance of private equity funds relative to other investment opportunities.
- In Models (1)-(5), the dependent variable is a dummy variable equal to 1 if the fund calls capital in a given quarter and 0 otherwise.
- In Models (6)-(9), the dependent variable is the natural logarithm of one plus the amount of the capital call expressed as a percentage of committed capital.
- Models (1)-(5) are estimated by OLS. Models (6)-(9) are estimated by Tobit.

- $\ln(P/D)$ is the natural logarithm of the price/dividend ratio of the S&P 500 at the end of the preceding calendar quarter.
- $\ln(TED)$ is the natural logarithm of the TED spread at the end of the preceding calendar quarter.
- % Uncalled is the percentage of committed capital that has not been called by the end of the previous calendar quarter.
- Crisis is a dummy for calendar quarters between 2007 Q3 and 2009 Q1 (inclusive).

- Column (2): funds are considerably more likely to call capital when valuations are high (coeff. on $\log(P/D)$ is positive and significant) and that capital calls are more likely when liquidity conditions tighten (coeff. on TED is positive and significant).
- Column (3) shows coeff. on % uncalled capital is positive and significant: given two funds of exactly the same age, the one that has called less capital is more likely to call capital in any given period.
- Column (4) shows that a dummy for the financial crisis, which equals one from 2007:Q3 to 2009:Q1, has a weak negative coeff. meaning that calls (weakly) declined during the crisis.

- Column (5): although calls (weakly) declined during the crisis, the component of calls not explained by P/D and TED sharply spike.
=> suggesting a greater liquidity demand by private equity funds, consistent with an increase in attractive investment opportunities and (for buyouts) a greater need for equity capital given the difficulty in obtaining debt financing.
- The fact that the loading on the crisis dummy is negative in Column (4) but positive in Column (5) indicates that on average, the recessionary environment (captured by P/D and TED) dominates the liquidity demand, and the overall effect of the crisis was to lessen call behavior.

- The negative loadings on the crisis interaction terms indicate that the sensitivity of call behavior to underlying macroeconomic fluctuation dampened significantly during this period.
- That is, capital calls were less sensitive to macroeconomic during the crisis period than before the crisis period.

- Columns (6)-(9) study the magnitude of capital calls rather than their prevalence.
- Estimates can be interpreted as the elasticity of capital calls with respect to market conditions.
- Improving valuation levels predict larger capital calls. Holding constant market valuation levels, tightening liquidity conditions predict larger capital calls.
- Amount of capital called jumps in the crisis. During the crisis, the sensitivity of capital calls to valuation levels effectively vanishes, but sensitivity to liquidity conditions is largely unchanged.

Table 10: Distributions and Macroeconomic Conditions

Market conditions
and capital
distributions

(1)-(5) OLS

(6)-(9) Tobit

Panel A: Sample includes all funds									
	Models (1)-(5): DV = Distribution Occurs					Models (6)-(9): DV = $\ln(1 + \% \text{ Distributed})$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(P/D)		0.133*** (0.019)	0.131*** (0.020)		0.107*** (0.024)	1.097*** (0.141)	1.062*** (0.143)		0.848*** (0.170)
ln(TED)		0.018* (0.010)	0.018* (0.010)		0.053*** (0.013)	0.156** (0.074)	0.151** (0.075)		0.398*** (0.091)
ln(% Uncalled)			-0.007*** (0.002)		-0.007*** (0.002)		-0.093*** (0.017)		-0.101*** (0.018)
Crisis Indicator				-0.068*** (0.023)	-0.529** (0.217)			-0.457*** (0.163)	-4.508*** (1.530)
Crisis×ln(P/D)					0.104* (0.055)				0.915** (0.388)
Crisis×ln(TED)					-0.011 (0.020)				-0.179 (0.140)
Crisis×ln(% Uncalled)					0.002 (0.005)				0.092*** (0.026)
Observations	39,277	39,258	39,258	39,277	39,258	39,258	39,258	39,277	39,258
R-squared	0.113	0.093	0.094	0.090	0.097	0.044	0.044	0.040	0.047

Panel B: Sample includes only VC funds									
	Models (1)-(5): DV = Distribution Occurs					Models (6)-(9): DV = $\ln(1 + \% \text{ Distributed})$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(P/D)		0.198*** (0.027)	0.198*** (0.027)		0.183*** (0.022)	2.138*** (0.296)	2.127*** (0.294)		1.898*** (0.247)
ln(TED)		0.032** (0.013)	0.032** (0.013)		0.065*** (0.015)	0.390*** (0.135)	0.388*** (0.134)		0.692*** (0.157)
ln(% Uncalled)			-0.002 (0.004)		-0.003 (0.004)		-0.027 (0.041)		-0.042 (0.041)
Crisis Indicator				-0.054*** (0.018)	0.066 (0.184)			-0.442** (0.192)	-1.097 (2.255)
Crisis×ln(P/D)					-0.047 (0.048)				-0.013 (0.583)
Crisis×ln(TED)					-0.041** (0.020)				-0.407* (0.221)
Crisis×ln(% Uncalled)					0.019 (0.012)				0.199* (0.118)
Observations	12,508	12,499	12,499	12,508	12,499	12,499	12,499	12,508	12,499
R-squared	0.094	0.054	0.054	0.040	0.057	0.039	0.039	0.028	0.041

Panel C: Sample includes only Buyout funds									
	Models (1)-(5): DV = Distribution Occurs					Models (6)-(9): DV = $\ln(1 + \% \text{ Distributed})$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln(P/D)		0.049* (0.025)	0.045* (0.026)		0.017 (0.037)	0.591*** (0.156)	0.552*** (0.161)		0.331 (0.231)
ln(TED)		0.021* (0.013)	0.021 (0.013)		0.059*** (0.019)	0.135* (0.082)	0.130 (0.083)		0.383*** (0.117)
ln(% Uncalled)			-0.012*** (0.003)		-0.012*** (0.003)		-0.118*** (0.019)		-0.123*** (0.019)
Crisis Indicator				-0.067*** (0.025)	-0.624** (0.277)			-0.506*** (0.153)	-4.513** (1.783)
Crisis×ln(P/D)					0.124* (0.068)				0.893** (0.439)
Crisis×ln(TED)					0.014 (0.030)				-0.060 (0.184)
Crisis×ln(% Uncalled)					-0.008 (0.007)				0.058 (0.048)
Observations	20,693	20,683	20,683	20,693	20,683	20,683	20,683	20,693	20,683
R-squared	0.081	0.055	0.056	0.056	0.060	0.033	0.034	0.032	0.037

- Table 10 indicates that distributions are positively related to P/D and the TED spread, and that these relations change in the crisis period.
- Similar to the result for calls, the sensitivity of distributions to the TED spread drops in the crisis, but in contrast to the result for calls, the sensitivity of distributions to P/D rises in the crisis.
- Crisis caused a drop in distributions, which is consistent with the general lack of liquidity in the IPO and M&A markets, and corresponding lack of exit opportunities (not fully captured by P/D and TED), during the crisis.

Implications (1)

- Comparing the magnitudes of the point estimates on $\ln(P/D)$ in Tables 9 and 10 shows that distributions are more sensitive to public market valuations than calls are.
=> a positive correlation between private equity returns and public equity returns.
- Net cash flows are procyclical and private equity funds are liquidity providers (resp. sinks) when valuations are high (resp. low).

Implications (2)

- Comparing Columns (6) and (7) for all funds (Panel A) across the tables, the elasticities with respect to calls are larger than those with respect to distributions.
=> on balance, private equity is a liquidity sink.
- However, this is almost entirely due to the effect of the financial crisis.
- Outside the crisis, there is little evidence for the widely-held view that private equity is a liquidity sink when liquidity conditions are poor.

V. PE Contract Terms and Performance

Determinants of GP Compensation

Carried Interest (Panel A)

Table 11: The Determinants of General Partner Compensation

	Panel A: Carried Interest (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
VC Boom	0.426** (0.205)	-0.035 (0.181)				
Buyout Boom				-0.791 (0.544)	-1.005* (0.539)	
ln(Fund Size)		0.373*** (0.119)	0.325*** (0.120)		0.139** (0.071)	0.126* (0.076)
ln(Fund No.)		0.579*** (0.204)	0.623*** (0.218)		-0.160 (0.151)	-0.184 (0.157)
Sample	VC	VC	VC	BO	BO	BO
Vintage Year FE?	No	No	Yes	No	No	Yes
Observations	295	294	294	542	541	541
R-squared	0.014	0.173	0.196	0.020	0.035	0.078

- Column (2) shows that during the boom, carried interest of VC partnerships was not higher after controlling for fund size.
- Column (5) shows that, controlling for fund size, buyout funds raised during the buyout boom received somewhat lower carry, but the effect is only marginally significant.
- Overall, controlling for fund size, carried interest does not move cyclically.
- In the cross-section, fund size is positively related to carried interest, controlling for vintage year fixed effects.

Determinants of GP Compensation

Initial Management Fee (Panel B)

	Panel B: Initial Management Fee (% per year)				
	(1)	(2)	(3)	(4)	(5)
VC boom × VC Fund	0.030 (0.053)	0.116** (0.053)	0.112** (0.053)		
Buyout Boom × Buyout Fund	-0.108** (0.049)	0.103** (0.050)	0.099** (0.049)		
Real Estate Boom × RE Fund	0.191 (0.116)	0.268** (0.110)	0.265** (0.106)		
ln(Fund Size)		-0.102*** (0.016)	-0.094*** (0.017)	-0.116*** (0.017)	-0.113*** (0.016)
ln(Fund No.)			-0.027 (0.034)	-0.040 (0.033)	-0.024 (0.032)
Buyout Indicator	-0.434*** (0.058)	-0.279*** (0.063)	-0.293*** (0.065)	-0.343*** (0.047)	-0.341*** (0.047)
Real Estate Indicator	-0.910*** (0.126)	-0.707*** (0.120)	-0.719*** (0.122)	-0.771*** (0.106)	-0.771*** (0.107)
Debt Indicator					-0.695*** (0.088)
Fund-of-funds Indicator					-1.080*** (0.102)
Sample		VC, Buyout, Real Estate			All
Vintage Year FE?	No	No	No	Yes	Yes
Observations	815	815	814	814	878
R-squared	0.280	0.337	0.338	0.398	0.416

- Determinants of the initial management fee, expressed as a percentage of committed or (very rarely) invested capital.
- Column (1) shows that buyout funds raised in the buyout boom obtain lower initial management fees, but the same is not true for VC or real estate funds.
- Column (2) shows that this result for buyout funds reflects the fact that larger funds obtain lower management fee percentages, and larger funds were raised during the boom.
- Controlling for size, all fund types received higher management fees during their respective boom periods.

- Column (4) of Panel B shows that the negative relation between fund size and initial management fee holds controlling for vintage year fixed effects.
- Column (5) extends the analysis to all funds, adding dummies for distressed debt and funds-of-funds. The coefficients on the fund type indicator variables show that, controlling for time effects and size, VC funds (the omitted category) have the highest management fees on average, followed by, in order, buyout, debt, real estate, and fund-of-funds.

- Table 11 provides novel evidence that boom times in fundraising have an effect on the terms of the compensation contract that GPs obtain.
- Taken together, these results suggest that the fixed/variable mix of GP compensation shifts to fixed components during fundraising booms.
- Talented GPs are in scarce supply, “money chasing deals” is an important factor in determining the price of GP services.

Table 12: Determinants of General Partner Capital Commitments

Determinants of GP capital commitments

This table presents cross-sectional fund-level estimates of the relations between general partner capital commitments and other fund characteristics. GP Bin is 0 if the GP capital commitment is below 0.99% of total fund size, 1 if it is between 0.99% and 1.01%, and 2 if it exceeds 1.01%. GP High is a dummy variable equal to 1 if the GP capital commitment exceeds 1.01% and 0 otherwise. $\ln(\text{GP}\%)$ is the log of GP capital commitment if the GP capital commitment is greater than 1.01%. All other variables are defined in previous tables. Even-numbered columns include vintage year fixed effects. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at the partnership level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	DV = GP Bin		DV = GP High		DV = $\ln(\text{GP}\%)$	
	Ordered Probit		Probit		OLS	
	(1)	(2)	(3)	(4)	(5)	(6)
VC boom \times VC fund	-0.153 (0.119)		-0.117 (0.165)		0.003 (0.200)	
Buyout boom \times Buyout fund	0.652** (0.286)		0.799*** (0.249)		0.112 (0.098)	
Real estate boom \times RE fund	-1.024* (0.559)		-0.931* (0.473)		-0.062 (0.128)	
$\ln(\text{Fund Size})$	0.106** (0.044)	0.103** (0.046)	0.129*** (0.048)	0.108** (0.049)	-0.077** (0.041)	-0.010** (0.041)
$\ln(\text{Fund No.})$	-0.084 (0.073)	-0.088 (0.073)	-0.092 (0.083)	-0.135 (0.083)	-0.080 (0.068)	-0.033 (0.069)
Buyout Indicator	-0.053 (0.133)	0.064 (0.108)	0.211 (0.181)	0.348** (0.144)	0.155 (0.190)	0.152 (0.103)
Real estate Indicator	0.206 (0.231)	0.159 (0.216)	0.559** (0.242)	0.517** (0.209)	0.524** (0.218)	0.528*** (0.153)
Debt Indicator		-0.090 (0.202)		0.118 (0.248)		0.549* (0.306)
Fund-of-funds Indicator		-0.461* (0.254)		-0.552* (0.283)		0.108 (0.232)
Constant			-1.114*** (0.237)	-0.628 (0.519)	1.794*** (0.227)	2.093*** (0.355)
Sample	VC,BO,RE		VC,BO,RE		VC,BO,RE	
Vintage Year FE?	No	Yes	No	Yes	No	Yes
N	907	987	907	984	344	362
R-squared	0.018	0.025	0.052	0.068	0.069	0.134

- GP Bin is 0 if the GP capital commitment is below 0.99% of total fund size, 1 if it is between 0.99% and 1.01%, and 2 if it exceeds 1.01%.
- GP High is a dummy variable equal to 1 if the GP capital commitment exceeds 1.01% and 0 otherwise.
- $\ln(\text{GP}\%)$ is the log of GP capital commitment if the GP capital commitment is greater than 1.01%.

- Table 12: mixed with respect to the influence of market conditions on GP capital commitments.
- Kaplan and Schoar (2005) and others argue that higher-ability GPs raise larger funds.
- Consistent with this, and with standard agency arguments that higher-ability agents require stronger incentives, we find that carried interest and capital commitments are both higher in larger funds, while management fees are lower.

Table 13: Fund Performance and Fund Contract Terms

Fund Performance and Fund Contract Terms

This table presents cross-sectional fund-level OLS estimates of the relations between final fund performance and the terms of the fund management contract. In all specifications, the dependent variable is the fund's final PME with respect to the S&P 500. The initial management fee is expressed in percent per year. "Carry High" and "Carry Low" are indicator variables for whether carried interest is greater than or less than 20%, respectively, and "GP % High" and "GP % Low" are indicator variables for whether the GP commitment is greater than 1.01% of fund size or less than 0.99% of fund size, respectively. All other variables are defined in previous tables. The table uses only the sample of liquidated funds. All specifications include vintage year fixed effects. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at the partnership level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable = PME						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial mgmt. fee	-0.043 (0.079)					0.017 (0.084)	0.001 (0.080)
Carried interest (%)		0.005 (0.020)				0.005 (0.022)	0.006 (0.022)
Carry High			-0.176 (0.130)				
Carry Low			-0.506*** (0.166)				
GP Commitment (%)				0.002 (0.004)			
GP % High					0.022 (0.062)	0.026 (0.061)	0.034 (0.061)
GP % Low					0.155* (0.083)	0.170* (0.090)	0.175* (0.090)
ln(Fund Size)							0.202 (0.129)
ln(Fund Size) ²							-0.020* (0.011)
Buyout dummy	0.078 (0.120)	0.175* (0.098)	0.156 (0.101)	0.172* (0.095)	0.161* (0.094)	0.169 (0.103)	0.174 (0.108)
Real estate dummy	0.028 (0.135)	0.149 (0.112)	0.125 (0.117)	0.137 (0.114)	0.146 (0.111)	0.184 (0.128)	0.166 (0.132)
Debt dummy	-0.119 (0.184)	0.006 (0.159)	-0.021 (0.162)	-0.000 (0.158)	-0.020 (0.161)	-0.014 (0.164)	-0.039 (0.167)
Fund-of-funds dummy	-0.089 (0.172)	0.193 (0.151)	0.163 (0.155)	0.193 (0.150)	0.150 (0.146)	0.215 (0.160)	0.201 (0.158)
Constant	0.942*** (0.204)	0.691 (0.431)	0.804*** (0.077)	0.787*** (0.074)	0.778*** (0.095)	0.632 (0.497)	0.281 (0.611)
Vintage Year FE?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	547	632	632	632	632	632	632
R-squared	0.061	0.057	0.064	0.057	0.063	0.068	0.071

- Columns (1) - (3) indicate no robust relation between the terms of GP compensation and ultimate net-of-fee fund performance.
- In particular, it is not the case that funds that charge higher fees underperform on a net-of-fee basis.

=> On average private equity funds with higher fees do in fact earn back those fees in the form of higher gross-of-fee returns.
- We confirm that these (lack of) results also hold for all fund types individually. Further, and consistent with Table 8, the same lack of results holds when we drop the year fixed effects that are included in Table 13.

- Consistent with an equilibrium in which GPs with higher compensation earn back their pay by delivering higher gross performance.
- This is true both with respect to higher compensation associated with fundraising booms, and with respect to differences in compensation across GPs at a point in time.
- Higher compensation appears to be justified by greater ability to generate gross returns.
- Consistent with arguments that GP services are the scarce resource (Kaplan and Schoar, 2005), the GP is largely able to capture the associated rents.

- Columns (4)-(7) investigate the relation between final PME and the GP capital commitment.
- Column (4) shows that there is no linear relation.
- Columns (5)-(7) show that funds in which the GP commits less than the standard 1% have higher returns, but the result is only marginally significant.
- This result is **contrary to** the predictions of costly signalling/asymmetric information models that would suggest that high-ability GPs would commit more capital to send a signal about ability.

- These results are **consistent with** symmetric information about GP ability.
- Under symmetric information, higher-ability GPs may choose to negotiate lower percentage capital commitments for themselves which they may prefer for diversification reasons.

VI. Discussion and Conclusion

- Uses a large, proprietary database of private equity funds, comprising almost 40% of the U.S. Venture Economics universe from 1984-2010.
- Determinants of private equity performance, management contract terms, and cash flow behavior.

- Private equity funds in the sample have on average outperformed public equities. This is especially true of the buyout sector.
- Broad market fluctuations are correlated with fluctuations in the performance of private equity.
- Market conditions also drive variation in fund size and the structure of compensation.
- During fundraising booms, GP compensation rises and shifts to fixed components, when GP bargaining power is greater.

- Net-of-fee returns, relative to public equities, that private equity GP generate are independent of the management fees and carried interest they charge.
- Higher-compensation funds generate gross returns relative to public equities that exceed the gross returns of lower-compensation funds.
- Liquidity properties of private equity cash flows:
Outside of the recent financial crisis, private equity tends to be a liquidity sink as market conditions deteriorate, and a source of liquidity as market conditions improve.