Investment Allocation and Performance in Venture Capital

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The Unique Structure of VC Funds

- VC (PE) funds have a typical 10-year life span – VC firms need to keep raising new funds.

Kleiner, Perkins, Caufield & Byers			
Fund	Vintage Year	Committed capital ($M)	NET IRR
II	1980	65	50.6%
III	1982	150	10.2%
IV	1986	150	11.0%
V	1989	150	35.7%
VI	1992	173	39.2%
VII	1994	225	121.7%
VIII	1996	299	286.6%
IX	1999	550	-23.3%
X	2000	625	-17.5%
XI	2004	400	
XII	2006	600	
XIII	2008	700	
XIV	2010	625	
XV	2012	525	
XVI	2014	450	
XVII	2016	400	

The Unique Structure of VC Funds (Cont.)

- VCs start the next fund while the current fund is still active.

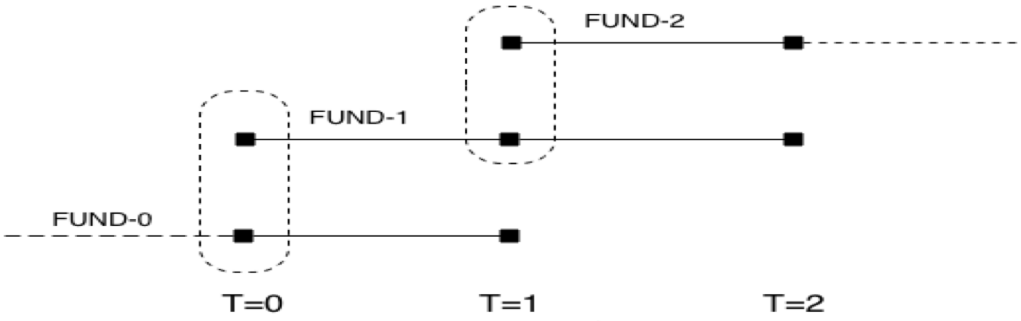

Figure 1: Fund Sequence & Investment Allocation

- Our research question: If there is a "next Google" in between two funds, would the VC place it to the current fund or the next one?
  - Why?
  - Implications for VC fund structure & performance (persistence)?

Does VC fund structure (or fundraising motive) affect investment decisions?

- Our story: Can affect VC investment and/or investment allocation decisions.
  - Within a VC fund.
  - Across VC funds when two funds overlap in time.
- Such decisions can then affect VC fund performance, and performance persistence.
- Such behavior has implications for VC-Investor relation, as well as the VC-entrepreneur relation.

How does the VC fund structure (or the fundraising motive) affect investment decisions?

- We have a stylized model.
- Find existence of an equilibrium in which raising capital for the next fund is affected by the early success of current fund.
- In such an equilibrium, VCs allocate higher quality projects in the early investment period.
- Intuition – VC's have limited time/ability and choose where to put in most effort. Gives rise to a coordination equilibrium in which VCs allocate effort to projects in the new (or young) fund – and learning about their ability primarily occurs depending on success or failure in new fund.
  - Possibility if multiplicity of equilibria – but less likely because the VC benefits from better contract in the new fund that is where he is expected to devote his energies.

Predictions from the model

- Higher probability of success in early investments.
- For two sequential funds, during concurrent investment period, better quality projects are allocated to the new fund instead of the current fund.
- Performance of early investments is more informative across VC funds of the same VC firm.

Data and Sample

- Information on VC firms, VC funds, and VC investments: Venture Xpert.
- Focus on VC fund investments by ***lead*** VCs.
  - VCs that make investment (allocation) decisions.
  - 2,617 firms, 4,578 funds, and 17,154 companies from 1975 to 2010.
- Measuring investment outcomes using successful exit: IPOs and IPOs/M&As.
  - Used and accepted in academic research.

VC Portfolio Company Exits (univariate) – as Lead VC

A: Portfolio Companies' Exits		
Exit Type	No. of Observations	% of Total Observations
IPO	1475	8.60%
M&A	4070	23.73%
Write-offs	11609	67.68%
Total	17154	

B: IPO Exit Rate Based on Investment Sequence			
Investment Sequence	Yes	No	T-stat
Is the Fund's First Investment	9.58%	8.39%	2.14**
Is the Fund's Last Investment	6.17%	9.09%	-5.13***
Is the Fund's First-year Investment	9.68%	7.76%	4.47**

C: IPO and M&A Exit Based on Investment Sequence			
Investment Sequence	Yes	No	T-stat
Is the Fund's First Investment	34.16%	31.93%	2.38**
Is the Fund's Last Investment	26.31%	33.56%	-7.63***
Is the Fund's First-year Investment	37.14%	28.58%	11.94**

Within fund performance: early investments in a fund perform better (Table 3)

	(1)	(2)	(3)
	Dep. Var: =1 if IPO		
=1 if the First Investment	0.2291***		
	(2.653)		
Investment Sequence No.		-0.6262***	
		(-5.082)	
=1 if First-year Investment			0.2512***
			(3.221)
	(4)	(5)	(6)
	Dep. Var: =1 if IPO or M&A		
=1 if the First Investment	0.2358***		
	(4.113)		
Investment Sequence No.		-0.5826***	
		(-7.211)	
=1 if First-year Investment			0.2763***
			(4.960)

Controls: Fund sequence, fund size, seed/early stage, No. of IPOs, Ind. M/B ratio, bubble period dummy, VC firm fixed effects.

Why do early investments in a fund perform better?

- (Natural) Decline in the quality of the projects available *within* the fund.
- Could be partly driven by the investment allocation *across* the funds of the same VC, as suggested by the model.
- How to test the investment allocation story?
  - Use the "paired" VC fund sample – two funds with overlapping investment period.

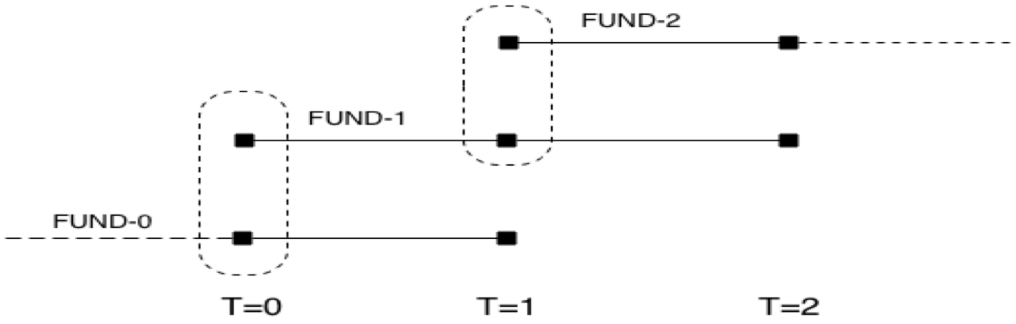

Figure 1: Fund Sequence & Investment Allocation

The “paired” VC fund sample – some definitions

- **Concurrent investment period:** One-year period after the start of the second fund’s first investment.
- **First fund:** early investments (pre-concurrent period); later investments (concurrent period)
- **Second fund:** early investments (concurrent period); later investments (post-concurrent period)

Exit rate of the "paired funds" (Table 4)

	First Fund Prior to Concurrent Period	First Fund during Concurrent Period	Second Fund during Concurrent Period
IPO Rate	10.11%	3.51%	9.11%
IPO and M&A Rate	31.48%	13.71%	36. 06%

Investment outcome of the paired funds during concurrent period (Table 5)

Dep. Var.	IPO	IPO+M&As	Ln(Financing rounds)
	(2)	(4)	(6)
=1 if Investment from Second Fund	0.230*	0.315***	0.150***
	(1.88)	(4.35)	(5.00)

- Logit & Linear Probability Models (above are OLS results)
- Controls: VC FE, Fund sequence, size, size-squared, early stage/seed fund, no. of IPOs in prior to fund's vintage year, industry M/B, seed/early-stage company, dummy for for 1995-2000.
- The results are more pronounced if (1) the first fund has successful early investments, and (2) the lead VC is more reputable (Table 6).

Performance persistence (fund-level; Table 7)

- Use IPO or IPO/M&A dummy as performance predictor.
- Performance persistence across two funds (Models 1 and 2).
- No performance persistence within the (first) fund (Models 3 and 4).

	Second Fund (Total Investments)		First Fund Later Investments	
	IPO	IPO/M&A	IPO	IPO/M&A
IPO in First Fund Investments	0.479*** (3.33)			
IPO/MA in First Fund Investments		0.331*** (2.65)		
IPO in First Fund Early Investments			0.066 (0.24)	
IPO/M&A in First Fund Early Investments				-0.247 (-1.53)

Performance persistence (fund-level; Table 8)

- First fund early investment success predict second fund early investment success (Models 1 and 2).
- First fund early investment success predict second fund overall investment success (Models 3 to 6).

	(1)	(2)	(3)	(4)	(5)	(6)
	Second Fund Early Investments		**Second Fund Overall Investments**			
Dep. Var.	**IPO**	**IPO/MA**	**IPO**	**IPO/MA**	**IPO**	**IPO/MA**
IPO First Fund Early Inv.	0.433***		0.515***		0.514***	
	(2.81)		(3.45)		(3.45)	
IPO/MA First Fund Early Inv.		0.248**		0.260**		0.259**
		(2.1)		(2.17)		(2.16)
IPO First Fund Late Inv.					0.062	
					(0.15)	
IPO/MA Fist Fund Late Inv.						0.324
						(1.26)

Investment Outcome and Fundraising (Table 9)

- Early investment success leads to more fundraising.
- The results are insignificant for more experienced VCs.
- Provides motives for investment allocation across VC funds.

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var:	Probability of raising next fund within the first 5 years					
	All VCs		High Experience VCs		Low Experience VCs	
=1 if first investment success	0.371***		0.271		0.515***	
	(2.75)		(1.37)		(2.73)	
=1 if first year investment success		0.488***		0.126		0.685***
		(3.16)		(0.53)		(3.16)

Conclusion

- VC fund structure (or the fund raising incentive) affects VC investment/ investment allocation decisions.
- We provide a stylized model for the rationales.
- We find evidence of investment allocation.
- Investment allocation has impacts on observed investment outcome and VC fund performance persistence.