PRIVATE COMPANY VALUATIONS BY MUTUAL FUNDS

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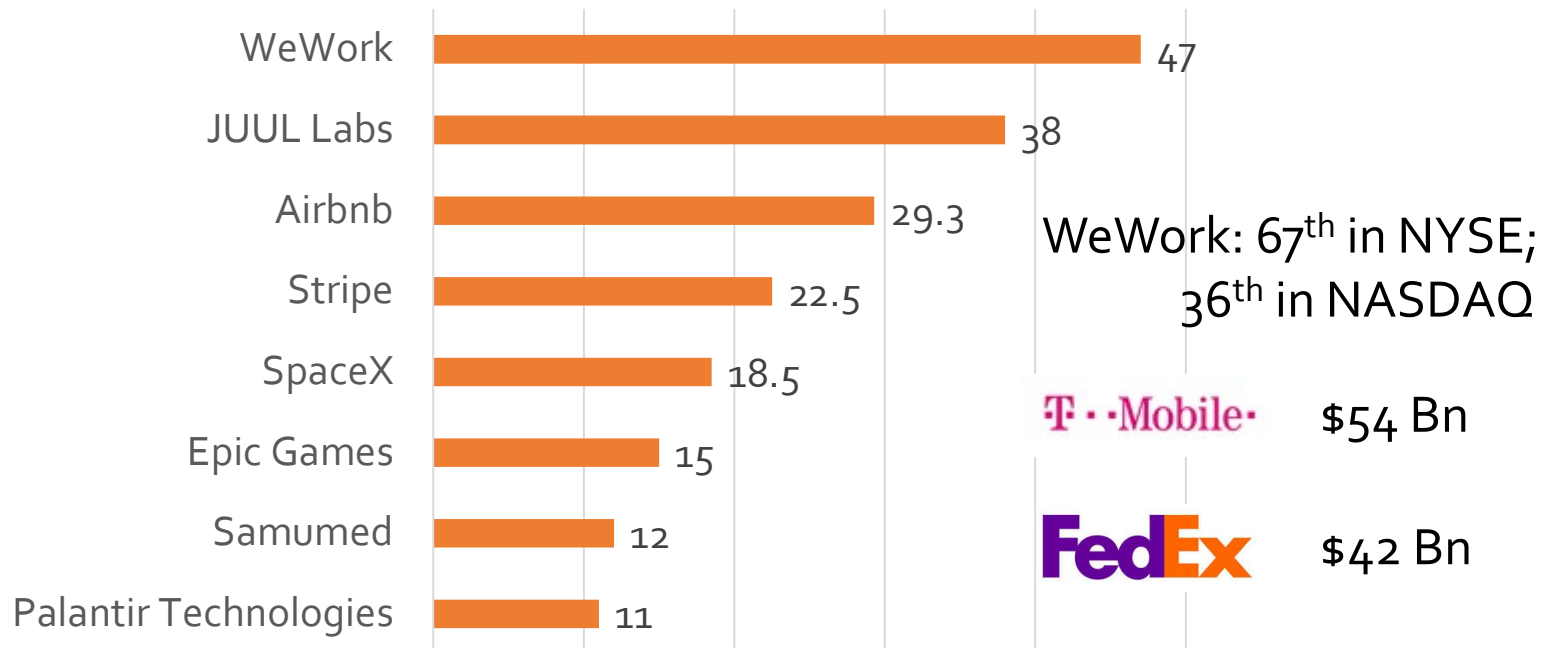
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ABFER 7th Annual Conference, May 2019

Background

- Pre-IPO startup valuations have soared.
  - 353 "Unicorns" (>$1B) as of May 2019 (45 in Jan 2014, 141 in Oct 2015)
  - WeWork, Airbnb, SpaceX are "Decacorns" (>$10B).

Company	Valuation
WeWork	47
JUUL Labs	38
Airbnb	29.3
Stripe	22.5
SpaceX	18.5
Epic Games	15
Samumed	12
Palantir Technologies	11

WeWork: 67th in NYSE; 36th in NASDAQ
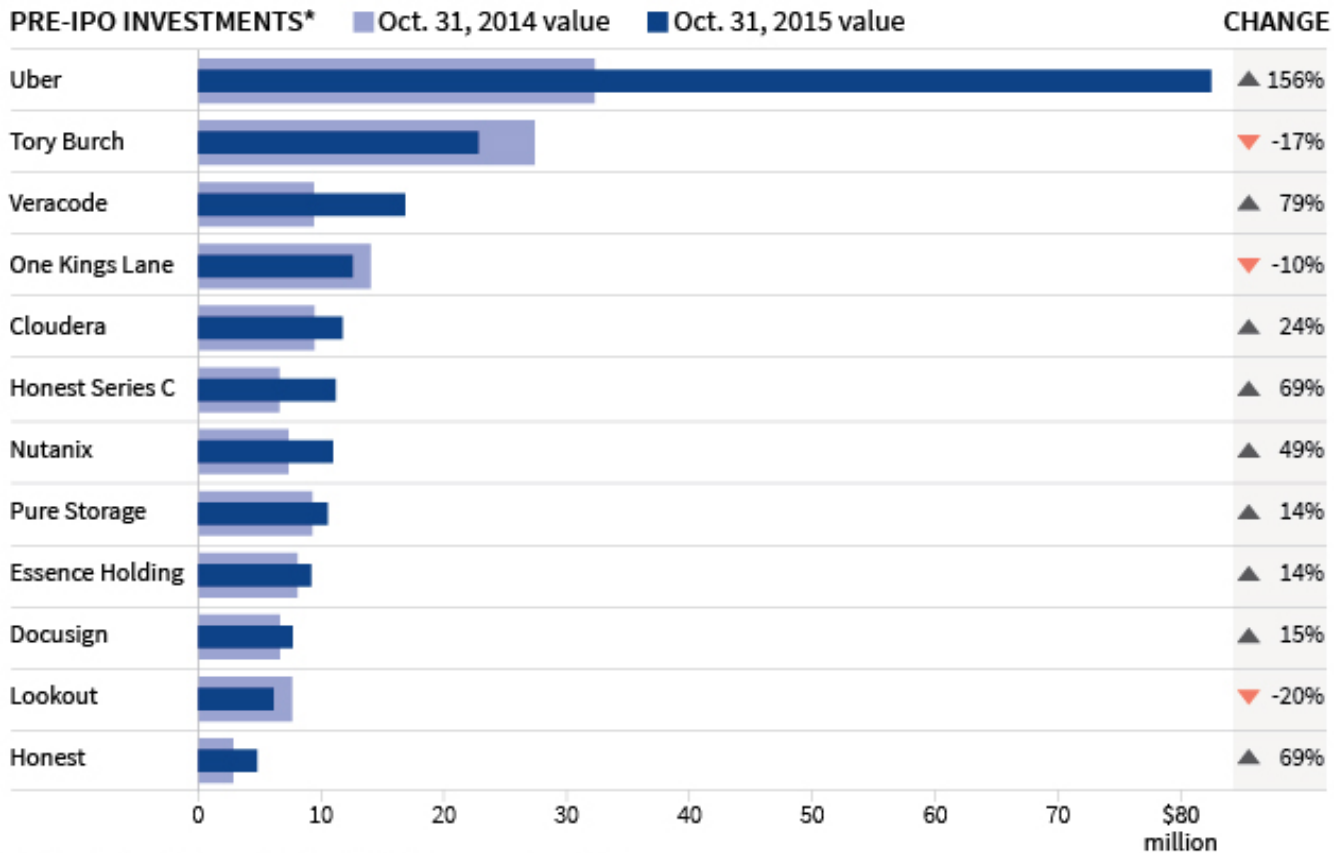
T · ·Mobile· $54 Bn

FedEx $42 Bn

Background

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  - 353 "Unicorns" (>$1B) as of May 2019 (45 in Jan 2014, 141 in Oct 2015)
  - WeWork, Airbnb, SpaceX are "Decacorns" (>$10B).
- Tech startups started delaying going public in the 2000's.
  - Age at IPO: 10 years in 2018 vs. 5 years in 1999
  - Number of Tech IPOs: 38 in 2018 vs. 370 in 1999
- Mutual funds started routinely investing in pre-IPO private securities around 2010.

Hartford fund rides Uber to a top performance

Growth Opportunities Fund loads up on private companies

PRE-IPO INVESTMENTS* ■ Oct. 31, 2014 value ■ Oct. 31, 2015 value   CHANGE

Company	Change
Uber	▲ 156%
Tory Burch	▼ -17%
Veracode	▲ 79%
One Kings Lane	▼ -10%
Cloudera	▲ 24%
Honest Series C	▲ 69%
Nutanix	▲ 49%
Pure Storage	▲ 14%
Essence Holding	▲ 14%
Docusign	▲ 15%
Lookout	▼ -20%
Honest	▲ 69%

0   10   20   30   40   50   60   70 $80 million

* Excludes Draft Kings as October 2014 data was not available.
Source: Hartford Growth Opportunities Fund annual reports

S. Culp, 09/08/2016   ⊙ REUTERS

- Hartford Growth Opportunities Fund: >6% pre-IPO investments
- It delivered 12.7% in 2015 compared to peer performance of 5.2%.

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Motivation

- Mutual funds invest along with VCs in *convertible preferred*, not common.

- No observable market prices, mutual funds value them as Level 3 assets and report quarterly *private valuations* to the SEC.

- Illiquid and inherently hard to value
  - Many are unprofitable, high-growth companies; few existing public comparables; infrequent events to update valuation

- Potential incentives to strategically 'manage' valuation

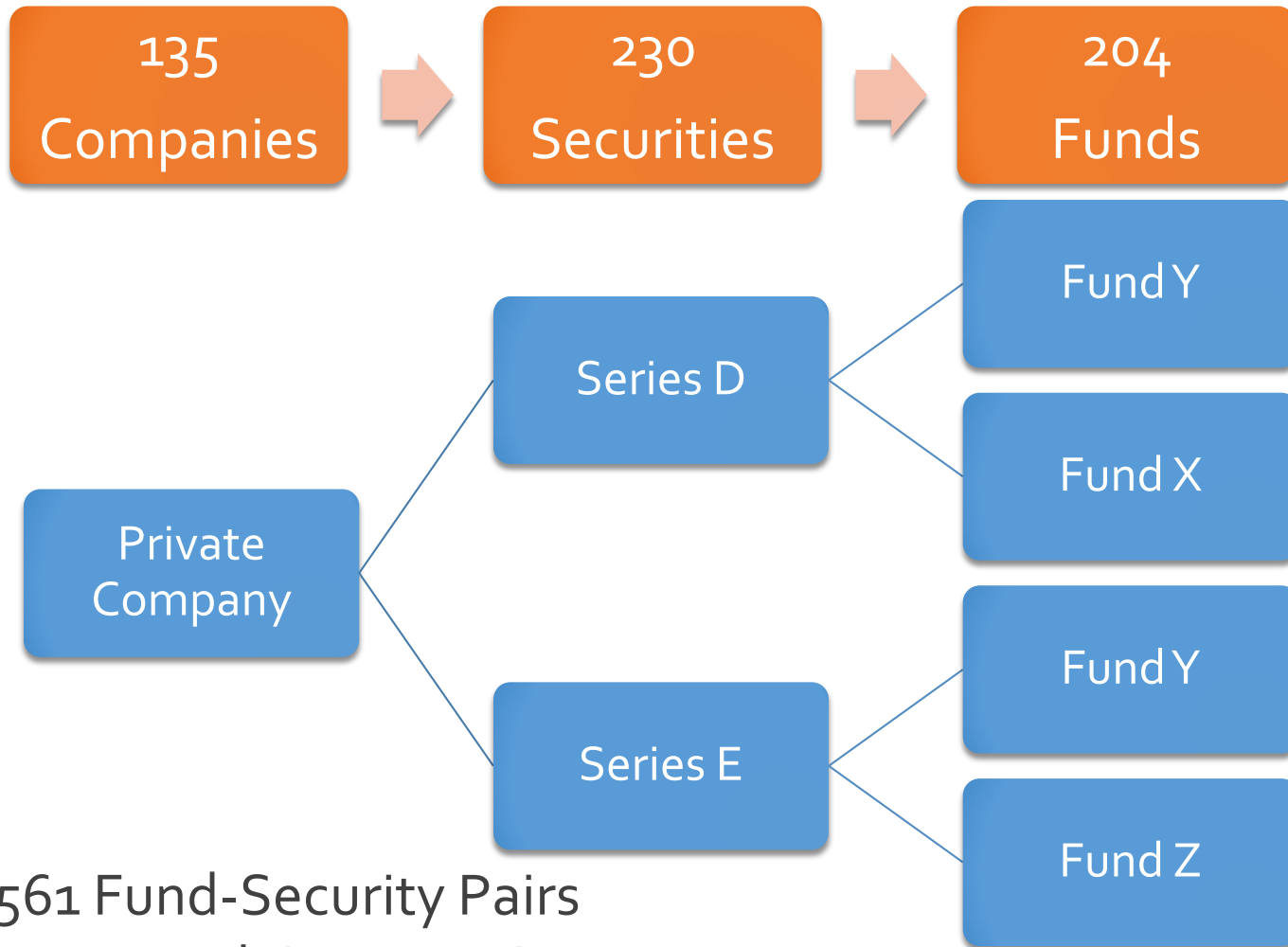Airbnb Series D Valuations by 3 Mutual Funds
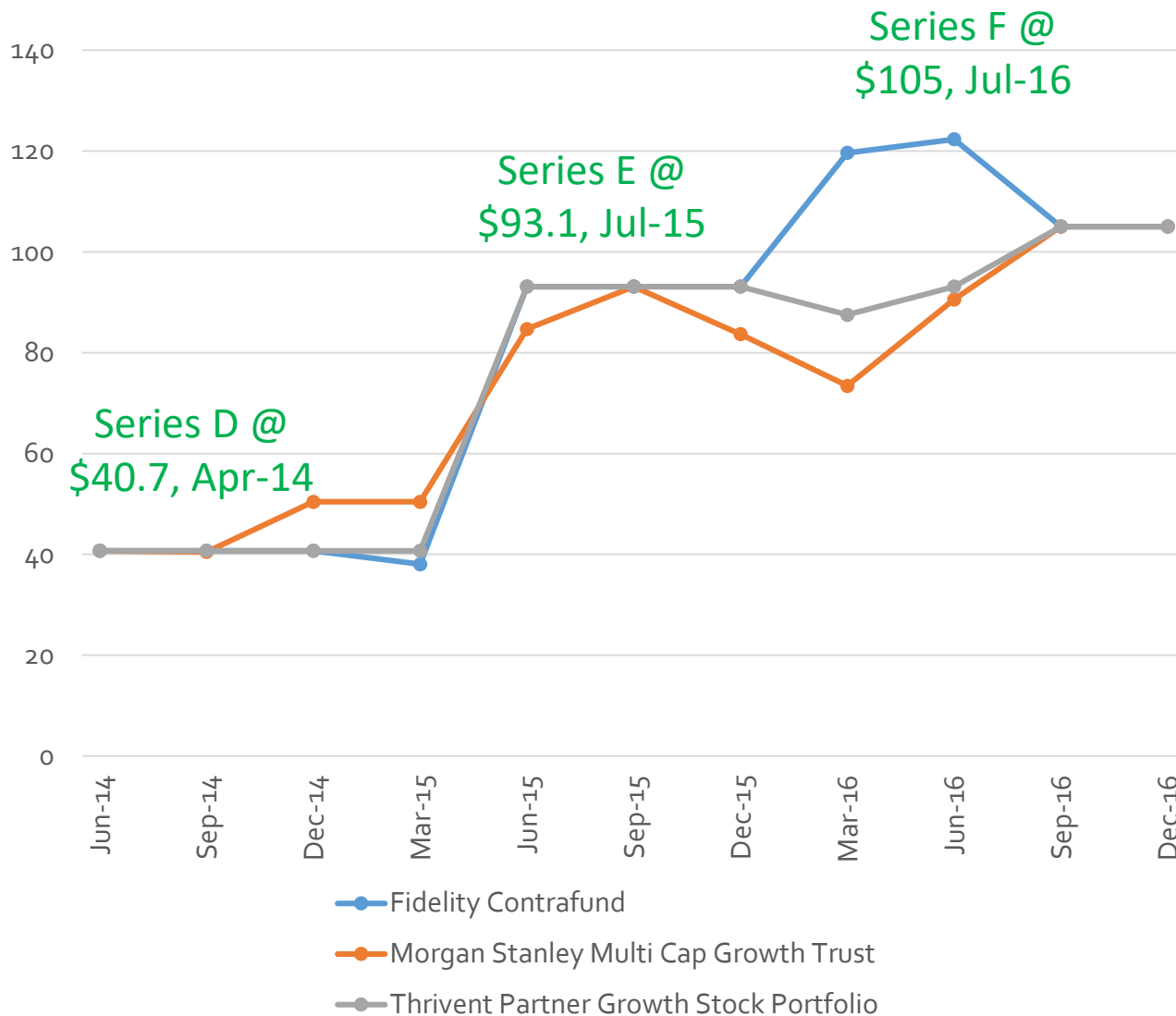
Research Questions

- Do mutual funds report *different simultaneous prices* for the same private security? How are the prices updated?

- Can fund *investors* capitalize on the mutual fund valuation practices? If so, do they trade opportunistically?

- Do fund *families* strategically use valuations to affect fund flows?

Data Collection

- Private companies have multiple funding rounds and series.

- Security names not standardized and no reliable identifier provided

- CRSP Survivor-Bias Free Mutual Fund Database

- SEC Mutual Fund N-CSR and N-Q Filings

- Certificate of Incorporation, S-1 Fillings from Genesis; TechCrunch, web search

- Sample: U.S. active equity mutual funds, 2010 to 2016

Sample: Security-Funds

135 Companies	→	230 Securities	→	204 Funds

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Private Company ─── Series D ─── Fund Y
                              └── Fund X
                └── Series E ─── Fund Y
                              └── Fund Z
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1,561 Fund-Security Pairs
12,007 Fund-Security-Quarters

Measuring Price Dispersion

- $DispPrc\_Avg_{s,q} = \dfrac{\sigma_{s,q}}{\bar{P}_{s,q}}$

  - $\sigma_{s,q}$: standard deviation of prices on security *s* across funds (in quarter *q*, with the same ending month)

  - $\bar{P}_{s,q}$: average price on security *s* across funds

- $DispPrc\_Med_{s,q}$: replace average price with median price

Descriptive Statistics: Security-Quarters

	No. Firm	No. Security	Security-Quarter Obs.	Mean	Std. Dev.	10%	25%	Median	75%	90%
Panel A: Security-Quarters (Full Sample)										
NumFd	106	170	1,359	8.435	6.547	2	3	7	11	18
Panel B: Security-Quarters (with same ending month) (Full Sample)										
DispPrc_Avg	106	170	2,274	0.039	0.084	0.000	0.000	0.000	0.049	0.130
DispPrc_Med	106	170	2,274	0.040	0.090	0.000	0.000	0.000	0.048	0.128
StdPrc	106	170	2,274	0.719	2.034	0.000	0.000	0.000	0.440	1.900
AvgPrc	106	170	2,274	16.153	23.367	2.566	4.581	8.467	16.730	32.390
MedPrc	106	170	2,274	16.232	23.547	2.565	4.581	8.432	16.860	33.300

Dispersion Within and Across Fund Families

	No. Firm	No. Security	Security-Quarter Obs.	Mean	Std. Dev.	10%	25%	Median	75%	90%
Panel C: Within Family, Family-Security-Quarters										
NumFd	98	154	2,463	2.970	1.483	2	2	3	3	5
DispPrc_Avg	98	154	2,463	0.003	0.031	0.000	0.000	0.000	0.000	0.000
DispPrc_Med	98	154	2,463	0.003	0.030	0.000	0.000	0.000	0.000	0.000
Panel D: Across Families, Security-Quarters										
NumFam	50	84	860	3.103	1.510	2	2	2	4	5
DispPrc_Avg	50	84	860	0.100	0.133	0.000	0.002	0.060	0.143	0.246
DispPrc_Med	50	84	860	0.103	0.155	0.000	0.002	0.058	0.143	0.251

Stale Pricing

	No. Security	Obs.	Mean	Std. Dev.	10%	25%	Median	75%	90%
Panel A: Family-Security-Quarter Return Characteristics									
Return	229	4,286	0.033	0.257	-0.162	-0.015	0.000	0.044	0.229
Panel B: Family-Security Return Characteristics									
%Zero Return_PVT	229	474	0.486	0.332	0.000	0.200	0.467	0.750	1.000
Qtr to Update	229	474	2.485	1.976	1	1	2	3	5
%Zero Return_PUB	6,416	18,373	0.003	0.052	0	0	0	0	0

- Fund families report **zero returns** in **49%** of all quarters and on average take **2.5 quarters** to update the price.

Deviation from Benchmark Price

- Dev = family valuation/benchmark valuation – 1
- Dummy (Dev) = 1 if |Dev| > 1% and 0 otherwise

	No. Firm	No. Security	$\sum$ Dummy (Dev)	Family-Security-Quarter Obs.	%Dev
Any Prior Deal Price	139	229	2,972	4,796	0.620
Latest Deal Price	139	229	3,008	4,763	0.632
Acquisition Price	137	224	3,560	4,653	0.765
Family-Firm Average Price	39	132	588	2,413	0.244

- Frequent deviation from deal price and acquisition price.
- Most fund families price different securities on the same company at the same price.

Deviation of Early Round Security Valuation from the New Round Deal Price
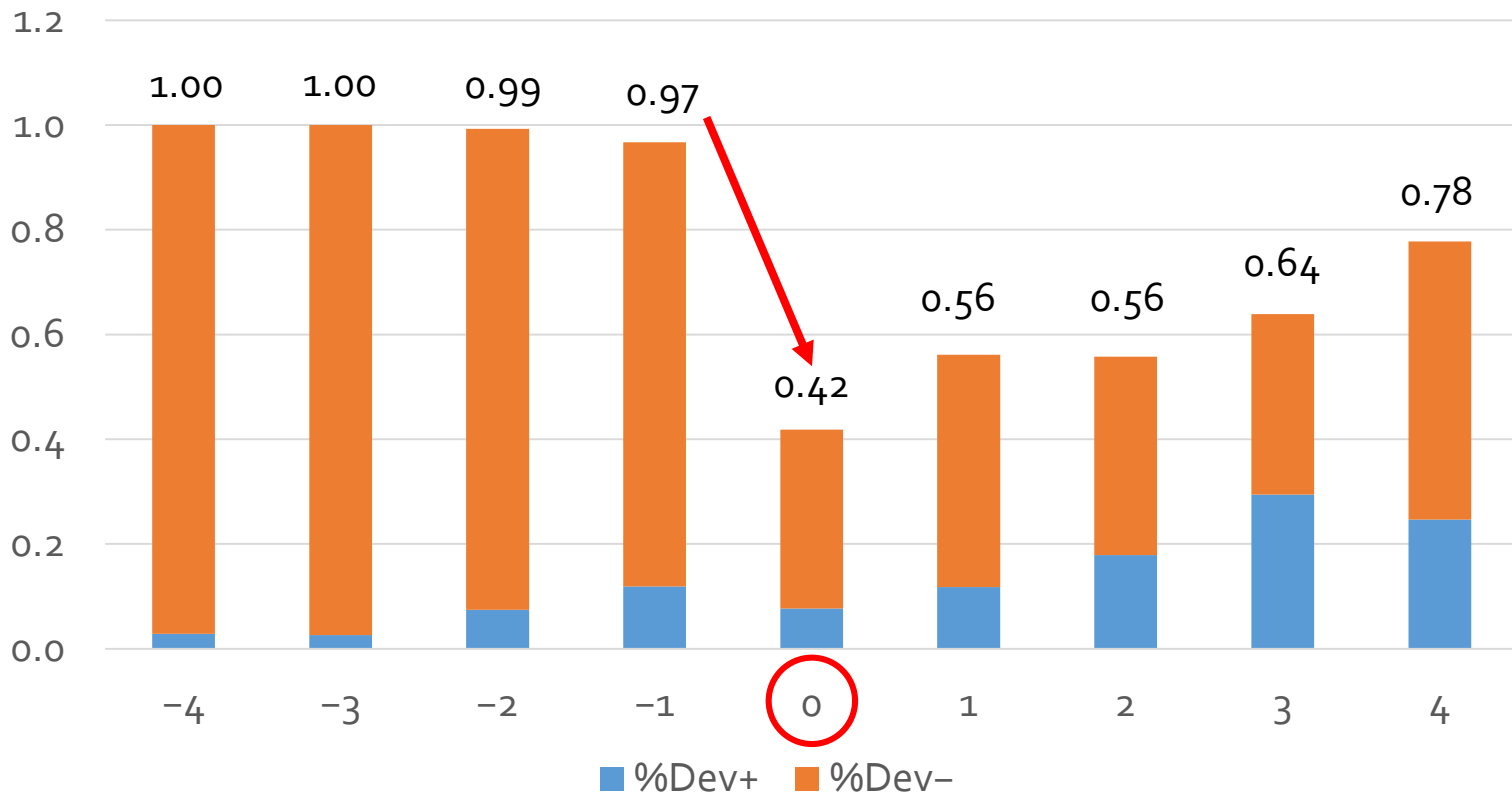
- 55% of early round securities' valuation gets matched to new deal price upon follow-on round.

Performance of Private Securities

- $(R_{F,s,q} - RF_q) = \alpha + \beta(R_{m,q} - RF_q) + \varepsilon_{F,s,q}$

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Alpha	0.029**	0.005	0.014	0.009	-0.015	-0.005
	(2.23)	(0.38)	(0.94)	(0.73)	(-1.22)	(-0.33)
Follow-on Dummy				0.351***	0.350***	0.333***
				(4.94)	(5.18)	(5.01)
MKTRET	0.317	0.440**	0.567**	0.403**	0.525***	0.562***
	(1.62)	(2.21)	(2.61)	(2.11)	(2.94)	(2.78)
MKTRET$_{t-1}$		0.604***	0.663**		0.601***	0.630***
		(3.33)	(2.41)		(3.99)	(2.80)
MKTRET$_{t-2}$		0.467*	0.252		0.455**	0.282
		(1.88)	(1.09)		(2.17)	(1.44)
HML and SMB	No	No	Yes	No	No	Yes
Market Beta	0.317	1.511***	1.482**	0.403**	1.581***	1.474***
	(1.62)	(3.33)	(2.64)	(2.11)	(4.16)	(3.19)
HML Tilt			-1.098**			-0.766*
			(-2.54)			(-1.91)
SMB Tilt			1.717***			1.399***
			(4.44)			(3.62)

Predictability of Fund Returns

- Stale pricing + price updating upon new funding rounds

- Change in deal price is large: mean **51%**; 75th 102%

- Examine *k*-day CARs of fund returns around follow-on round of financing

Mutual Fund Returns around Follow-On Rounds

	[−10, −1]	[−5, −1]	[−3, −1]	[0, 3]	[0, 5]	[0, 10]	[11, 15]	[16, 20]
Panel A: Benchmark-adjusted CAR (CAR_BMK)								
All Funds	0.095	0.043	0.037	0.141*	0.311***	0.429**	-0.129	-0.042
	(0.73)	(0.55)	(0.62)	(1.95)	(2.70)	(2.62)	(-1.43)	(-0.54)
Big 5	0.187	0.095	0.037	0.123	0.197**	0.300***	-0.055	0.009
	(1.32)	(0.95)	(0.47)	(1.48)	(2.56)	(2.84)	(-0.67)	(0.09)
Non-Big 5	0.000	-0.011	0.036	0.159	0.428**	0.561*	-0.205	-0.093
	(0.00)	(-0.11)	(0.49)	(1.56)	(2.33)	(1.95)	(-1.41)	(-0.96)

- Big 5 Fund Families: Fidelity, T. Rowe Price, Hartford, American Funds, and Blackrock

- Benchmark-adjusted CAR: 5-day **31 bps**, 10-day **43 bps**

- Similar results for market-adjusted CAR and among funds without redemption fee

Fund Flows around Follow-on Rounds

- Stale pricing + price updating upon new funding rounds → predictable abnormal fund returns

- Do fund investors exploit this trading opportunity?

$[-30, -1]$	$[-20, -1]$	$[-10, -1]$	$[-5, -1]$	$[-3, -1]$	$[0, 3]$	$[0, 5]$	$[0, 10]$	$[0, 20]$	$[0, 30]$
Panel C: Benchmark-adjusted Flow around Follow On Round (without Redemption Fee)									
0.093	0.088	0.078	0.070*	0.057	-0.068	-0.013	-0.041	-0.031	-0.029
(1.19)	(1.23)	(1.16)	(2.01)	(1.66)	(-0.85)	(-0.29)	(-0.56)	(-0.65)	(-0.75)
Panel D: Z-Score on Flow around Follow On Round (without Redemption Fee)									
0.002	-0.005	-0.007	0.048	0.031	-0.026	-0.029	-0.062	-0.046	-0.033
(0.09)	(-0.25)	(-0.32)	(1.07)	(0.78)	(-0.91)	(-1.14)	(-1.32)	(-1.63)	(-1.41)

- Investors do not trade opportunistically by timing their entry into and exit from funds.

Determinants of Within Family Allocation (%)

- $Allocation_{f,s,q} = \alpha + \beta_1 FamVal_{f,q-1} + \beta_2 Experience_{f,q-1} + \varepsilon_{f,s,q}$

		Model 1	Model 3
	RETBMK	0.094***	0.011
		(3.11)	(0.73)
	Dollar Fee	28.802***	-2.084
		(2.85)	(-0.21)
	PE	5.228***	3.383***
		(4.96)	(3.48)
	RETBMK × PE		0.489***
			(2.87)
	Dollar Fee × PE		35.235**
			(2.23)
	Controls	Yes	Yes
	Family-Quarter FE	Yes	Yes

High Family Value

PE Experience

- Past performance and fee revenue mostly matter for funds that already hold private securities.

Strategic Year End Pricing

- Convexity in fund flow-performance relation and spillovers in cash inflows between funds within a family

- We conjecture that private securities held by funds that outperformed in first 3 quarters are marked up more aggressively in 4th quarter.

- Diff-in-diff around follow-on rounds between:
  - Q1-3 vs. Q4
  - Top 20% performers (in Q1-3) vs. rest

Strategic Year End Pricing: CAR

Rank of Fund Performance	[0, 3]			[0, 5]			[0, 10]		
	Q1-3	Q4	Q4 − Q1-3	Q1-3	Q4	Q4 − Q1-3	Q1-3	Q4	Q4 − Q1-3
Panel A: Benchmark-adjusted CAR (CAR_BMK)									
Bottom 80%	0.260***	-0.059	-0.319***	0.315***	0.025	-0.290**	0.573***	0.080	-0.493**
	(2.94)	(-0.95)	(-2.84)	(4.05)	(0.31)	(-2.54)	(3.82)	(0.88)	(-2.59)
Top 20%	0.106	0.536***	0.430***	0.269***	0.492***	0.223*	0.343***	0.724***	0.382**
	(1.60)	(6.93)	(4.23)	(3.94)	(5.80)	(2.03)	(4.45)	(5.45)	(2.73)
Top − Bottom	-0.154	0.595***	0.749***	-0.046	0.467***	0.513***	-0.230	0.644***	0.874***
	(-1.39)	(6.02)	(4.95)	(-0.44)	(4.00)	(3.23)	(-1.37)	(4.00)	(3.71)

- Top 20% funds mark up more in Q4 than
  - First 3 quarters
  - Bottom 80% funds

Strategic Year End Pricing: ΔValue × WTPE

Rank of Fund Performance	$(V_q/V_{q-1} - 1) \times$ WTPE			$Ln(V_q/V_{q-1}) \times$ WTPE		
	Q1-3	Q4	Q4 − Q1-3	Q1-3	Q4	Q4 − Q1-3
Bottom 80%	0.104**	0.121***	0.017	0.076**	0.099***	0.023
	(2.23)	(8.10)	(0.43)	(2.41)	(8.27)	(0.88)
Top 20%	0.154***	0.280***	0.126***	0.120***	0.217***	0.097***
	(4.40)	(5.83)	(2.74)	(4.27)	(5.96)	(2.96)
Top − Bottom	0.050	0.159***	0.109*	0.044	0.118***	0.074*
	(0.86)	(3.16)	(1.79)	(1.05)	(3.08)	(1.75)

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$$\bullet \frac{V_q}{V_{q-1}} = \frac{V_q}{DEAL_S} \times \frac{DEAL_S}{DEAL_{S-1}} \times \frac{DEAL_{S-1}}{V_{q-1}}$$

$$\bullet \ln\left(\frac{V_q}{V_{q-1}}\right) = \ln\left(\frac{V_q}{DEAL_S}\right) + \ln\left(\frac{DEAL_S}{DEAL_{S-1}}\right) - \ln(\frac{V_{q-1}}{DEAL_{S-1}})$$

markup after the new deal   deal price change   markup since the prior deal

Strategic Year End Pricing: ΔValue × WTPE

Rank of Fund Performance	$\text{Ln}(V_q/\text{DEAL}_s) \times \text{WTPE}$			$\text{Ln}(\text{DEAL}_s/\text{DEAL}_{s-1}) \times \text{WTPE}$			$\text{Ln}(V_{q-1}/\text{DEAL}_{s-1}) \times \text{WTPE}$		
	Q1-3	Q4	Q4 − Q1-3	Q1-3	Q4	Q4 − Q1-3	Q1-3	Q4	Q4 − Q1-3
Bottom 80%	-0.022***	-0.024***	-0.002	0.101***	0.130***	0.029	0.003	0.007	0.003
	(-4.85)	(-4.51)	(-0.32)	(3.23)	(11.63)	(1.07)	(0.63)	(0.68)	(0.33)
Top 20%	-0.029**	-0.015	0.014	0.197***	0.219***	0.022	0.048***	-0.013	-0.061***
	(-2.72)	(-1.48)	(0.89)	(6.34)	(7.05)	(0.66)	(3.08)	(-0.71)	(-2.91)
Top − Bottom	-0.007	0.010	0.016	0.095**	0.089**	-0.006	0.045***	-0.019	-0.064***
	(-0.58)	(0.86)	(0.95)	(2.16)	(2.70)	(-0.15)	(2.71)	(-0.95)	(-2.77)

markup after the new deal   deal price change   markup since the prior deal

- Top 20% funds enter Q4 with low markup w.r.t. the prior deal price → more "dry powder" to strategically time the markup at year ends.

Conclusion

- Material variation in the prices of private securities: **10%** across families; Stale pricing

- Fund **investors** can capitalize on stale pricing but do not trade opportunistically.
  - Predictable abnormal fund returns around follow-on rounds: 5-day CAR **31 bps**
  - No abnormal fund flows

- Fund **families** capitalize on stale pricing.
  - Favor experienced and high family value funds
  - Strategically time the markup after the year-end follow-on rounds