

Effect of Underwriter Mergers and Closures on IPOs

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We know very little how underwriters affect startup exit outcomes.

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Kia Koikallitcheva, author of [Axios Pro Rata](#)



*Silicon Valley Bank
“banked 44% of
2022’s tech and
healthcare IPOs.”*

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Challenge:

- ① Identifying exogenous variation in the continuity of VC-underwriter relationships.
- ② Data on VC firm-underwriter interactions.
- ③ Data on employment histories for workers at underwriting banks.

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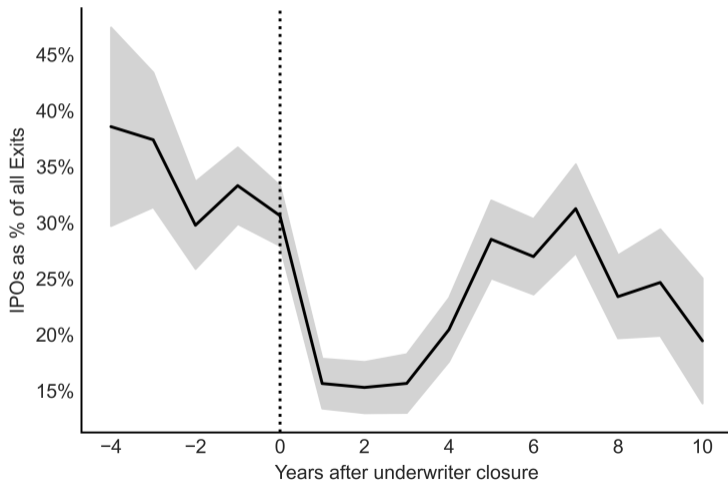
Challenge:

- 1 Identifying exogenous variation in the continuity of VC-underwriter relationships.
- 2 Data on VC firm-underwriter interactions.
- 3 Data on employment histories for workers at underwriting banks.

Approach:

- 1 Leverage bankruptcies and acquisitions of underwriters as quasi-random shock to VC ties.
- 2 PitchBook data details collaborations between VCs and IPO underwriters on new issues.
- 3 LinkedIn data on bank employee histories.

A VC's IPO exits drop immediately after an prior IPO underwriter closes.



Underwriter closures have significant effects on associated VCs' startups

- ① How much are startup exits affected by interrupted VC-underwriter relationships?
 - 9% decrease in the ratio of IPOs to all forms of exit.

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- ② How do bank closures affect human ties between the VC and underwriter?
 - High employee turnover at acquired IPO underwriters.
 - Only **23.4%** of key employees at target underwriter go on to work at acquiring underwriter.
 - **40%** of the employees that do return work in new roles.

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 - 9% decrease in the ratio of IPOs to all forms of exit.
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 - High employee turnover at acquired IPO underwriters.
 - Only **23.4%** of key employees at target underwriter go on to work at acquiring underwriter.
 - **40%** of the employees that do return work in new roles.
- ③ **What are the consequences on VC returns?**
 - Fund multiples decrease by **12.9%**, future underwriting spreads increase by **22.3bp**.

We contribute to several strands of literature

- **Time series variation in the number of IPOs and acquisitions:** Doidge et al. (2017); Ewens and Farre-Mensa (2020); Gao et al. (2013)

Here: Concentration of the banking industry may help explain overall downward trend in the number of IPOs.

- **How VC firms add value to portfolio companies:** Bernstein et al. (2016); Ewens and Marx (2018); Lerner and Nanda (2020); Puri and Zarutskie (2012); Gompers et al. (2020); Lerner (1994); Hsu (2004); Sorensen (2007)

Here: Relationships with underwriters improve returns for startups and VC investors.

- **Value of underwriting relationships in and out of VC industry:** Fernando et al. (2012); Megginson and Weiss (1991); Asker and Ljungqvist (2010)

Here: Ties to underwriters are also essential to private market players through VC exits.

Data and Sample Construction

We construct a panel of VCs to study VC-underwriter interactions

- PitchBook, 2006-2016.
 - 252 underwriters.
 - 1,255 VC firms.
 - 2,292 IPOs.
- 47 close by means of acquisition, and 5 went out of business.
- We construct a panel at the VC firm-quarter level (26,343 observations).
- We also construct a complementary startup-VC level dataset.
 - Allows us to examine individual startup outcomes.
 - Also useful for mechanism tests.
 - 30,267 startup-VC observations (1,134 VCs, 13,340 startups).

» Summary Statistics

Closures come from a variety of underwriters over the entire sample

| Underwriter | Closure Date | Type | #VCs | #Startups |
|----------------------------|--------------|--------|------|-----------|
| Lehman Brothers | 2008-09-17 | M&A | 188 | 17,789 |
| Bear Stearns | 2008-03-16 | M&A | 96 | 9,317 |
| Merrill Lynch | 2008-09-14 | M&A | 116 | 9,294 |
| Wachovia Bank | 2008-10-03 | M&A | 70 | 7,899 |
| Pacific Growth Equities | 2009-02-27 | M&A | 104 | 11,386 |
| Thomas Weisel | 2010-07-01 | M&A | 304 | 28,457 |
| Morgan Keegan | 2012-04-02 | M&A | 60 | 7,373 |
| ThinkEquity Partners | 2012-10-17 | Bankr. | 125 | 16,923 |
| Gleacher and Company | 2014-03-13 | M&A | 57 | 10,204 |
| McAdams Wright Ragen | 2014-07-02 | M&A | 29 | 6,316 |
| KBCM Technology Group | 2014-09-03 | M&A | 308 | 39,025 |
| Arlington Asset Investment | 2016-06-14 | M&A | 49 | 7,416 |
| Muriel Siebert & Co. | 2016-12-16 | M&A | 30 | 8,159 |

We exploit underwriter closures as exogenous variation to VC ties.

Ideal experiment: Randomly assign underwriter relationships to a subset of identical VCs.

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Naive approach: regress VC IPOs on # of underwriting relationships. This approach is obviously flawed:

- Networks are formed endogenously.
- Better VCs will have more relationships *and* more IPOs.

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How do we address this gap?

- Use a shock to relationships unrelated to VC firm skill.
- Measure: proportion of IPO underwriters of previous 5 years lost to closure/merger (FracClosed).

Measure treatment as proportion of closed IPO underwriters

Consider VC firm A:

- IPO with Lehman Bros. in Q1/2008 (L.B. fails in 9/2008).
- IPO with Bank of America in Q2/2008.

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| VC Firm | Year | Quarter | # Under-writers | # Closed | FracClosed |
|---------|------|---------|-----------------|----------|------------|
| A | 2007 | 4 | 0 | 0 | 0.0 |
| A | 2008 | 1 | 1 | 0 | 0.0 |
| A | 2008 | 2 | 2 | 0 | 0.0 |
| A | 2008 | 3 | 2 | 1 | 0.5 |
| A | 2008 | 4 | 2 | 1 | 0.5 |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| A | 2012 | 2 | 2 | 1 | 0.5 |
| A | 2012 | 3 | 1 | 0 | 0.0 |
| A | 2012 | 4 | 0 | 0 | 0.0 |

Measure treatment as proportion of closed IPO underwriters

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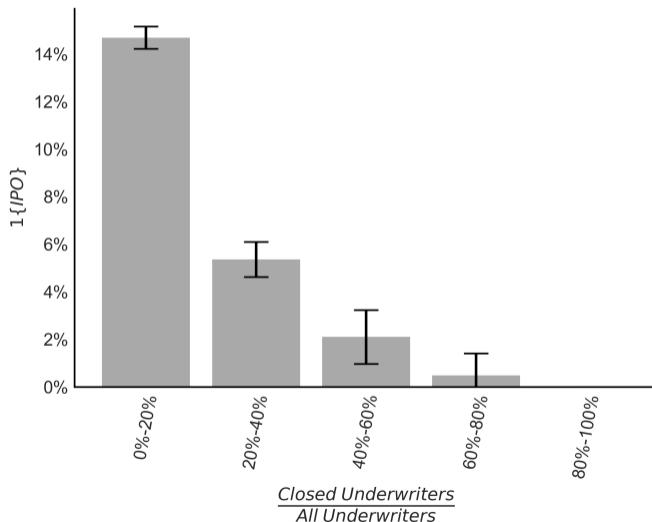


| VC Firm | Year | Quarter | # Under-writers | # Closed | FracClosed |
|---------|------|---------|-----------------|----------|------------|
| A | 2007 | 4 | 0 | 0 | 0.0 |
| A | 2008 | 1 | 1 | 0 | 0.0 |
| A | 2008 | 2 | 2 | 0 | 0.0 |
| A | 2008 | 3 | 2 | 1 | 0.5 |
| A | 2008 | 4 | 2 | 1 | 0.5 |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| A | 2012 | 2 | 2 | 1 | 0.5 |
| A | 2012 | 3 | 1 | 0 | 0.0 |
| A | 2012 | 4 | 0 | 0 | 0.0 |

Treatment groups do not vary significantly in most basic characteristics

| | Treated | Control | t-stat |
|---|----------|----------|--------|
| <i>Panel A: VC Firm Characteristics</i> | | | |
| Founding Year | 1994.69 | 1993.19 | 1.51 |
| 1(HQ = CA) | 0.39 | 0.37 | 0.38 |
| AUM (\$M) | 2,405.08 | 3,006.97 | -0.46 |
| VC Firm Age | 14.59 | 12.90 | 2.24** |
| Fund Age | 5.02 | 4.83 | 0.72 |
| 1(New Fund) | 0.18 | 0.14 | 1.33 |
| <i>Panel B: VC investment characteristics</i> | | | |
| % Healthcare | 0.13 | 0.15 | -0.94 |
| % IT | 0.25 | 0.23 | 0.75 |
| % California | 0.21 | 0.20 | 0.41 |
| Deal Size (\$M) | 11.59 | 9.48 | 0.81 |

More lost relationships are associated with fewer IPOs for the VC.



How do we know that the human relationships were interrupted?

- We use both bankruptcies *and* acquisitions as closure events.
- **Assumption:** both constitute an interruption of VC-underwriter relationships.
- Is this really the case?
 - E.g. IPO underwriting employees continue working at acquirer.
 - Why should this restrict VC access to underwriters?

Very few employees from target underwriters go on to work at acquiring underwriter

| | % Acquirer Employed | N |
|---|------------------------|---------|
| <i>Panel A: All employees</i> | | |
| | 23.4% | 144,771 |
| <i>Panel B: Sorted by job title seniority</i> | | |
| Senior | 27.3% | 31,306 |
| Middle | 22.6% | 31,566 |
| Lower | 16.0% | 24,794 |
| Uncategorized | 24.8% | 57,105 |
| <i>Panel C: Job title contains IPO keywords</i> | | |
| Yes | 26.6% | 7,583 |
| No | 23.6% | 137,188 |

Main Results

Baseline regression well suited to Poisson MLE

$$\# \text{ IPOs}_{it} = \exp\{\alpha_1 + \beta_1 \text{FracClosed}_{it} + X'_{it}\gamma + \eta_t + \epsilon_{it}\}$$

- Parameterizes Poisson arrival rate of IPOs for VC i in a quarter t .
- **Controls:** Number of VC-underwriter ties, VC geography, availability of PE capital, quarter FE, VC FE (in robustness).
- **Independent Variable:** Fraction of a VC's recent underwriters that closed in last 5 years.

VCS with underwriter closures see **22.3%** decline in quarterly IPOs, on average.

| | # IPOs | | | |
|-----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed | -3.618*** (0.314) | -3.140*** (0.292) | -3.668*** (0.307) | -3.601*** (0.300) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| Pseudo R ² | 0.09 | 0.15 | 0.17 | 0.19 |
| No. Observations | 26,343 | 26,343 | 21,319 | 21,269 |

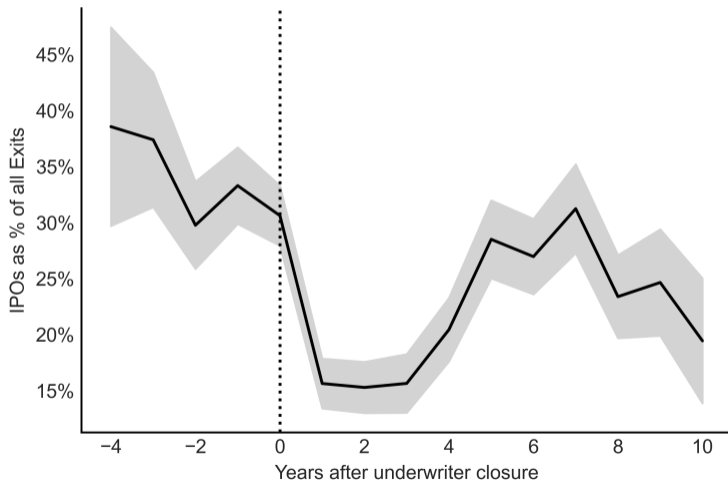
► OLS specification

► VC Fixed Effects

► Callaway Sant'anna

► Startup-level

We also investigate the how the VC's proportion of startup exits is affected



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$$\frac{\# \text{ IPOs}_{it}}{\# \text{ Exits}_{it}} = \alpha_1 + \beta_1 \text{FracClosed}_{it} + X'_{it}\gamma + \eta_t + \epsilon_{it}$$

- $\# \text{ Exits}_{it} = \# \text{ IPOs}_{it} + \# \text{ Acquisitions}_{it}$
- **Controls:** VC geography, availability of PE capital, quarter FE, VC FE (in robustness).
- **Independent Variable:** Fraction of a VC's recent underwriters that closed in last 5 years.

Exits shift away from IPOs toward Acquisitions for affected VCs

| | # IPOs / # Exits | | | |
|-----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed | -0.523*** (0.030) | -0.441*** (0.030) | -0.462*** (0.030) | -0.408*** (0.026) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| R-squared | 0.053 | 0.110 | 0.113 | 0.240 |
| No. observations | 18,867 | 18,867 | 15,403 | 15,395 |

- The coefficient translates to a ~9% decrease in the proportion of IPO exits compared to the mean.

Are underwriter closures truly exogenous?

Exogeneity assumption:

- Startup IPO underwriting is one of many bank objectives.
- Unlikely to be directly responsible for closure/merger.
- **Threat:** What if “bad” VCs tend to choose underwriters more likely to close?

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How do we address this?

- ① VC fixed effects.

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How do we address this?

- ① VC fixed effects.
- ② Restrict attention to banks who were ubiquitous in the market.
 - Strong pre-closure reputation.
 - Closure was most unanticipated.
 - Lehman Brothers and Bear Stearns.

Inclusion of VC fixed effects has little impact on results.

| | $\mathbb{1}\{\# \text{ IPOs} > 0\}$ | | | |
|-----------------------|-------------------------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed | -0.254*** (0.017) | -0.218*** (0.017) | -0.331*** (0.027) | -0.300*** (0.026) |
| Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | NO | YES |
| VC Fixed Effects | NO | NO | YES | YES |
| R ² | 0.055 | 0.098 | 0.141 | 0.120 |
| No. observations | 26,343 | 26,343 | 26,343 | 21,269 |

►► Baseline results

VCS partners of Lehman Brothers/Bear Stearns saw larger effect

| | # IPOs | | | |
|-----------------------|----------------------|---------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| CrisisBankFlag | -0.754*** (0.108) | -0.261** (0.110) | -0.336*** (0.112) | -0.307*** (0.108) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| Pseudo R ² | 0.08 | 0.14 | 0.16 | 0.18 |
| No. Observations | 26,343 | 26,343 | 21,319 | 21,269 |

[» Shorter window](#)[» OLS version](#)[» Startup level](#)

Mechanisms

Why does underwriter closure affect VC IPOs?

Information relationships

Underwriters generate info on opaque offerings through VC relationships.

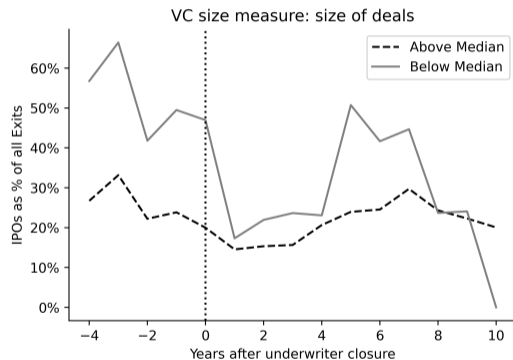
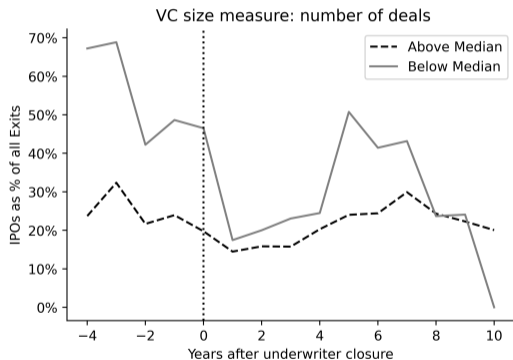
Preferences

VCs help underwriters match their varied preferences for IPO characteristics.

Specialization

VCs (for investment) and underwriters (for IPOs) have matching startup specializations.

Smaller VCs more strongly affected by lost underwriters



Smaller VCs more strongly affected by lost underwriters

| | # IPOs | | | |
|----------------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed \times VCSIZE | 0.634** (0.278) | 0.585** (0.251) | 0.575** (0.253) | 0.723** (0.283) |
| FracClosed | -6.137*** (1.004) | -5.506*** (0.920) | -5.456*** (0.940) | -6.506*** (1.063) |
| VCSIZE | 0.160*** (0.036) | 0.148*** (0.035) | 0.169*** (0.044) | 0.129*** (0.046) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| Pseudo R-squared | 0.12 | 0.18 | 0.19 | 0.20 |
| No. observations | 16,885 | 16,885 | 16,869 | 14,242 |

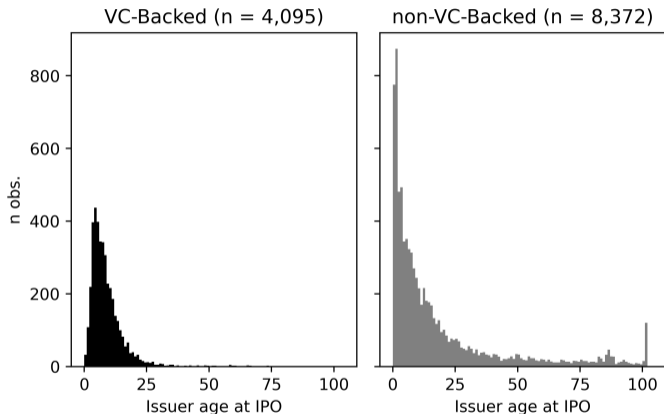
GPs tend to work with underwriters with which they share an employment history.



VC's may provide a signal of quality in a one-shot IPO

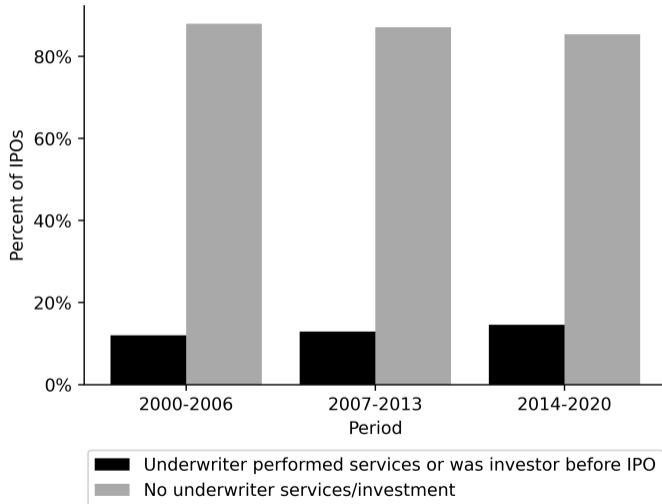
- IPO underwriting is a risky undertaking.
- In other industries, monitors can use track record (Diamond (1991)).
- PE firms may lend credibility to portfolio companies, e.g. debt markets (Malenko and Malenko (2015)).
- Repeat interactions with PE firms can form the basis for evaluating the quality of opaque opportunities.

VC backing may speed up the IPO process for startups

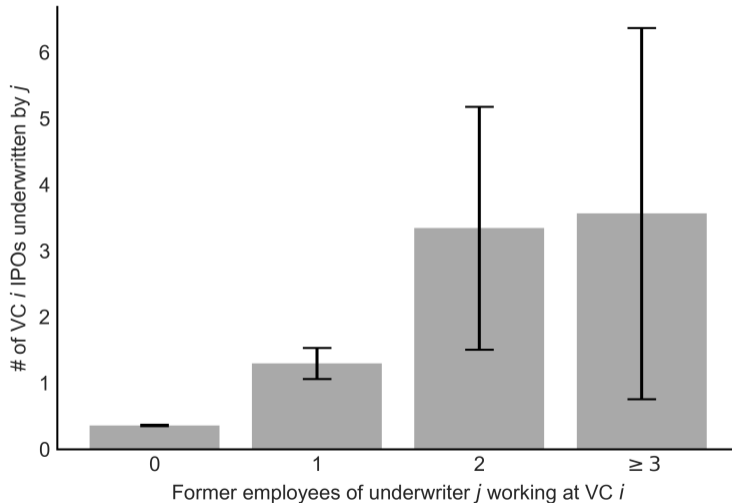


- Lerner and Nanda (2020): VC-backed startups are smaller, less profitable, less R&D intensive at time of IPO.

Past underwriter-startup interactions predict IPO underwriting



Overlap in employees leads to increased IPO activity



More underwriter-VC ties leads to more IPOs at the startup level

| | $\mathbb{1}\{\text{IPO}\}$ | | |
|-----------------------------|----------------------------|---------------------|---------------------|
| | (1) | (2) | (3) |
| log(# Underwriters) | 0.021*** (0.002) | 0.010*** (0.003) | 0.008*** (0.002) |
| NumVCs | | 0.099*** (0.005) | 0.084*** (0.005) |
| Industry-Year Fixed Effects | NO | NO | YES |
| Geographic Controls | NO | YES | YES |
| R-squared | 0.006 | 0.046 | 0.149 |
| No. observations | 13,340 | 13,340 | 13,340 |

- Better-connected VCs seem to play an important information role in the startup-underwriter match.

Why does underwriter closure affect VC IPOs?

Information relationships

Underwriters generate info on opaque offerings through VC relationships.

Preferences

VCs help underwriters match their varied preferences for IPO characteristics.

Specialization

VCs (for investment) and underwriters (for IPOs) have matching startup specializations.

VCs who lost an underwriter that frequently underwrote IPOs see a stronger effect

| | # IPOs | | |
|-----------------------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) |
| FracClosed \times HighFrequency | -1.941 (1.268) | -2.469** (1.120) | -3.603*** (1.052) |
| HighFrequency | -0.049 (0.098) | -0.023 (0.113) | -0.166 (0.109) |
| FracClosed | -2.623*** (0.685) | -1.878*** (0.581) | -1.801*** (0.598) |
| Other Control Variables | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES |
| Pseudo R ² | 0.09 | 0.15 | 0.19 |
| No. Observations | 26,343 | 26,343 | 21,269 |

VCs who lost an underwriter that underwrote smaller IPOs see a stronger effect

| | # IPOs | | |
|-------------------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) |
| FracClosed \times SmallSize | -3.244 (2.731) | -6.333** (2.987) | -6.970* (3.788) |
| SmallSize | 0.432** (0.176) | 0.430** (0.173) | 0.551*** (0.209) |
| FracClosed | -3.486*** (0.333) | -2.926*** (0.306) | -3.345*** (0.313) |
| Other Controls | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES |
| Pseudo R ² | 0.09 | 0.15 | 0.19 |
| No. Observations | 26,343 | 26,343 | 21,269 |

Why does underwriter closure affect VC IPOs?

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Decrease in IPOs not explained by industry-year fixed effects

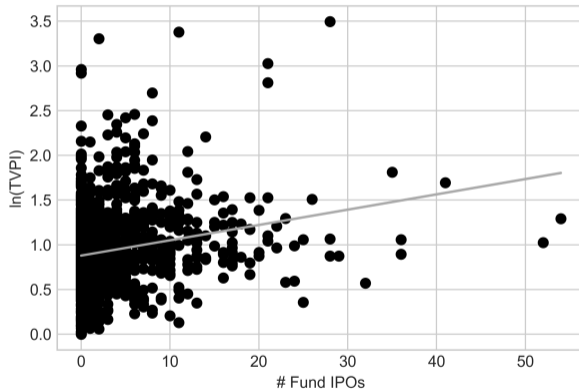
| | $\mathbb{1}\{\text{IPO}\}$ | | | |
|-----------------------------|----------------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| Treated | -0.042*** (0.009) | -0.054*** (0.007) | -0.047*** (0.007) | -0.047*** (0.006) |
| NumVCs | | 0.038*** (0.001) | 0.039*** (0.001) | 0.038*** (0.001) |
| Other Controls | NO | YES | YES | YES |
| VC Fixed Effects | NO | YES | NO | YES |
| Industry-Year Fixed Effects | NO | NO | YES | YES |
| R ² | 0.003 | 0.281 | 0.235 | 0.328 |
| No. Observations | 30,267 | 30,267 | 30,267 | 30,267 |

►► Baseline results

►► Continuous treatment

VC-Underwriter relationships and value

IPOs correlate heavily with fund returns



- IPOs not necessarily always the optimal exit, but a larger exit choice set dominates.

Multiples on invested capital for treated VC funds decrease by 12.9%

| | log(TVPI) | | | |
|----------------------------|-------------------|-------------------|---------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed | -0.077 (0.129) | -0.263 (0.167) | -0.488** (0.246) | -0.776*** (0.252) |
| Other Controls | NO | YES | YES | YES |
| Vintage Year Fixed Effects | NO | YES | NO | YES |
| VC Fixed Effects | NO | NO | YES | YES |
| R ² | 0.001 | 0.244 | 0.460 | 0.603 |
| No. Observations | 954 | 954 | 954 | 954 |

►► Dummy Treatment

Treated VCs pay higher fees to all future underwriters

| | PerShareUnderwriterSpread | | |
|-----------------------|---------------------------|----------------------|----------------------|
| | (1) | (2) | (3) |
| Treated | -0.021 (0.038) | 0.009 (0.039) | 0.223*** (0.054) |
| IPOProceeds | -0.640*** (0.038) | -0.639*** (0.040) | -0.536*** (0.053) |
| Quarter Fixed Effects | NO | YES | YES |
| VC Fixed Effects | NO | NO | YES |
| R-squared | 0.084 | 0.215 | 0.333 |
| No. observations | 8,158 | 8,158 | 8,158 |

Treated VCs may be more exposed to future IPO underpricing

| | Day1%PriceChange | | |
|-----------------------|------------------|---------|---------|
| | (1) | (2) | (3) |
| Treated | 3.325* | 3.385* | 2.187 |
| | (1.827) | (1.960) | (5.280) |
| Quarter Fixed Effects | NO | YES | YES |
| VC Fixed Effects | NO | NO | YES |
| R ² | 0.002 | 0.102 | 0.517 |
| No. Observations | 2,359 | 2,359 | 2,359 |

The failure of Silicon Valley Bank and implications for future work

| VC Firm Name | % SVB Underwriter | Total IPOs |
|---------------------------|-------------------|------------|
| Biobrit | 40% | 15 |
| Bay City Capital | 38% | 32 |
| Lightstone Ventures | 36% | 11 |
| Osage University Partners | 32% | 22 |
| Nextech Invest | 31% | 16 |
| Aisling Capital | 31% | 42 |
| Flagship Pioneering | 29% | 41 |
| Brookside Capital | 29% | 21 |
| Sands Capital | 29% | 14 |
| Third Rock Ventures | 28% | 25 |
| New Leaf Venture | 28% | 43 |

Conclusion: VC-underwriter ties are an important component of VC exit decisions

- We document a change in VC startup exits following the interruption of VC-underwriter relationships:
 - Use closures and mergers as pseudo-exogenous variation in relationships.
 - We show that underwriter employees are displaced by these events.
 - IPO proportion of exits decreases by 9%.
- We investigate mechanisms that could drive this result:
 - Find evidence consistent with information production through VC-underwriter relationships and underwriter preferences.
 - Do not find evidence favoring a underwriter specialization interpretation.
- We show the resulting effect on VC firm value:
 - Return multiples decrease by 12.9%.
 - Future IPOs become more costly through fees and underpricing.

Thanks for your attention!

Full Summary Statistics

| | N | mean | std | min | median | max |
|--|--------|----------|----------|---------|---------|-----------|
| <i>Panel A: VC-level statistics (N = 1,255)</i> | | | | | | |
| Founding Year | 1,072 | 1995.61 | 12.67 | 1833.00 | 1998.00 | 2014.00 |
| 1(HQ=CA) | 1,255 | 0.34 | 0.47 | 0.00 | 0.00 | 1.00 |
| AUM (\$M) | 660 | 1,343.26 | 3,090.08 | 0.00 | 362.34 | 24,000.00 |
| <i>Panel B: VC-quarter level statistics (N = 26,343)</i> | | | | | | |
| VC Firm Age | 26,343 | 17.40 | 11.46 | 0.00 | 15.00 | 176.00 |
| VC Fund Age | 16,343 | 5.25 | 2.38 | 0.00 | 5.25 | 10.00 |
| 1(New Fund) | 26,343 | 0.14 | 0.35 | 0.00 | 0.00 | 1.00 |
| # Underwriters | 26,343 | 1.92 | 0.59 | 0.69 | 1.79 | 4.06 |
| 1(Lost Underwriter) | 26,343 | 0.35 | 0.48 | 0.00 | 0.00 | 1.00 |
| FracClosed | 26,343 | 0.07 | 0.13 | 0.00 | 0.00 | 1.00 |
| # Investments | 26,343 | 4.43 | 7.68 | 1.00 | 1.00 | 223.00 |
| DealSize (\$M) | 26,343 | 9.39 | 16.89 | 0.00 | 0.00 | 99.31 |
| % California | 26,343 | 0.20 | 0.35 | 0.00 | 0.00 | 1.00 |
| % US | 26,343 | 0.41 | 0.47 | 0.00 | 0.00 | 1.00 |
| # Acquisitions | 26,343 | 0.47 | 0.96 | 0.00 | 0.00 | 15.00 |
| # IPOs | 26,343 | 0.16 | 0.44 | 0.00 | 0.00 | 5.00 |

► Data

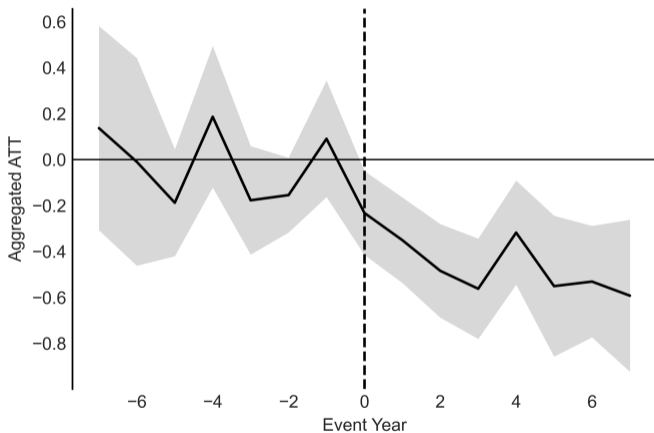
Appendix

Robustness: baseline test, using OLS instead of MLE

| | log(# IPOs+1) | | | |
|-----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed | -0.193*** (0.014) | -0.172*** (0.012) | -0.178*** (0.014) | -0.168*** (0.014) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| R-squared | 0.065 | 0.108 | 0.124 | 0.134 |
| No. observations | 26,343 | 26,343 | 21,319 | 21,269 |

► Back

Robustness: using Callaway & Santanna Method for staggered DID tests



Robustness: Lehman Brothers/Bear Stearns test, using shorter sample window

| | # IPOs | | | |
|-----------------------|----------------------|---------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| CrisisFlag | -0.702*** (0.104) | -0.262** (0.108) | -0.368*** (0.108) | -0.348*** (0.105) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| Pseudo R-squared | 0.06 | 0.14 | 0.17 | 0.18 |
| No. observations | 14,503 | 14,503 | 11,860 | 11,833 |

» Back

Robustness: Lehman Brothers/Bear Stearns test using OLS regressions

| | # IPOs | | | |
|-----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| CrisisFlag | -0.076*** (0.007) | -0.044*** (0.007) | -0.051*** (0.008) | -0.049*** (0.007) |
| Geographic Controls | NO | NO | YES | YES |
| Other Controls | NO | NO | NO | YES |
| Quarter Fixed Effects | NO | YES | YES | YES |
| R-squared | 0.061 | 0.103 | 0.120 | 0.130 |
| No. observations | 26343 | 26343 | 21319 | 21269 |

» Back

Robustness: Lehman Brothers/Bear Stearns test using startup-VC level data

| | $\mathbb{1}\{\text{IPO}\}$ | | | |
|-----------------------------|----------------------------|--------------------|---------------------|---------------------|
| | (1) | (2) | (3) | (4) |
| CrisisBankFlag | 0.042*** (0.006) | -0.028* (0.016) | 0.031*** (0.006) | -0.034** (0.015) |
| Other Controls | NO | YES | YES | YES |
| VC Fixed Effects | NO | YES | NO | YES |
| Industry-Year Fixed Effects | NO | NO | YES | YES |
| R-squared | 0.003 | 0.228 | 0.161 | 0.262 |
| No. observations | 22,416 | 22,416 | 22,416 | 22,416 |

►► Back

Robustness: startup-VC level test using continuous treatment variable, *FracClosed*

| | $\mathbb{1}\{\text{IPO}\}$ | | | |
|-----------------------------|----------------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | (3) | (4) |
| FracClosed | -0.330*** (0.046) | -0.139*** (0.037) | -0.204*** (0.033) | -0.130*** (0.034) |
| Other Controls | NO | YES | YES | YES |
| VC Fixed Effects | NO | YES | NO | YES |
| Industry-Year Fixed Effects | NO | NO | YES | YES |
| R-squared | 0.004 | 0.278 | 0.234 | 0.326 |
| No. observations | 30,267 | 30,267 | 30,267 | 30,267 |

► Back

Robustness: TVPI test using a dummy variable, *Treatment* as the treatment variable.

| | log(TVPI) | | | |
|----------------------------|-------------------|-------------------|------------------|--------------------|
| | (1) | (2) | (3) | (4) |
| Treated | -0.008 (0.048) | -0.055 (0.073) | 0.093 (0.087) | -0.154* (0.086) |
| Other Controls | NO | YES | YES | YES |
| Vintage Year Fixed Effects | NO | YES | NO | YES |
| VC Fixed Effects | NO | NO | YES | YES |
| R-squared | 0.000 | 0.242 | 0.457 | 0.599 |
| No. observations | 954 | 954 | 954 | 954 |

» Back