Failed Venture Capital Fundraising Campaigns and Startup Growth:

The Value-Add of Venture Capital Due-diligence

Juanita Gonzalez-Uribe – LSE, CEPR, JPAL
Robyn Klingler-Vidra – King's
Su Wang – Amsterdam
Xiang Yin – LSE

What this paper is about

- VC investors fund start-ups that become some of the world's most innovative firms
- In the US, VC-backed companies account for 40% market cap. (Gornall and Strebulaev, 2021).
- The link between VCs an innovation is global and research shows it is not just a curiosity
- VCs provide "smart money" to the start-ups in which they invest (Lerner and Nanda, 2020).

- This paper offers a **new** line of research examining **the impact that VCs have on companies in which they do NOT invest**

Motivation

- VCs spend significant time and resources on start-ups outside of their portfolios
- Primarily, through "due-diligence"—process to scrutinize firms for potential investment
- For every 1 company in which they invest, VCs consider 100, and closely interact with 30
- Due-diligence crucial for returns (Gompers et al., 2020; Cumming and Zambelli, 2016).

- Our **novel** premise is that it adds value to the **companies** that VCs scrutinize **but ultimately reject for investment**

Information and other growth frictions

- VCs conduct due-diligence to reduce uncertainty and information asymmetries
- Yet, due diligence can help mitigate info. and other growth frictions entrepreneurs face
- Given their experience, VCs better at judging success + resources (Axelson, 2007; Sariri 2022)

- However, it is not a given that VC due-diligence should constitute a value-add to startups
- Overconfident or busy founders may not learn from low-stakes feedback, VCs that reject companies may not provide constructive feedback or connections, + there should be no effect if entrepreneurs face no information or other growth frictions

Empirical Challenges

- Empirically determining whether VC due diligence affects start-up growth is difficult

1. Observing firms that go through due-diligence, but do not obtain investment, is rare.
2. Tracking start-up growth is challenging
3. Selection for due diligence is endogenous

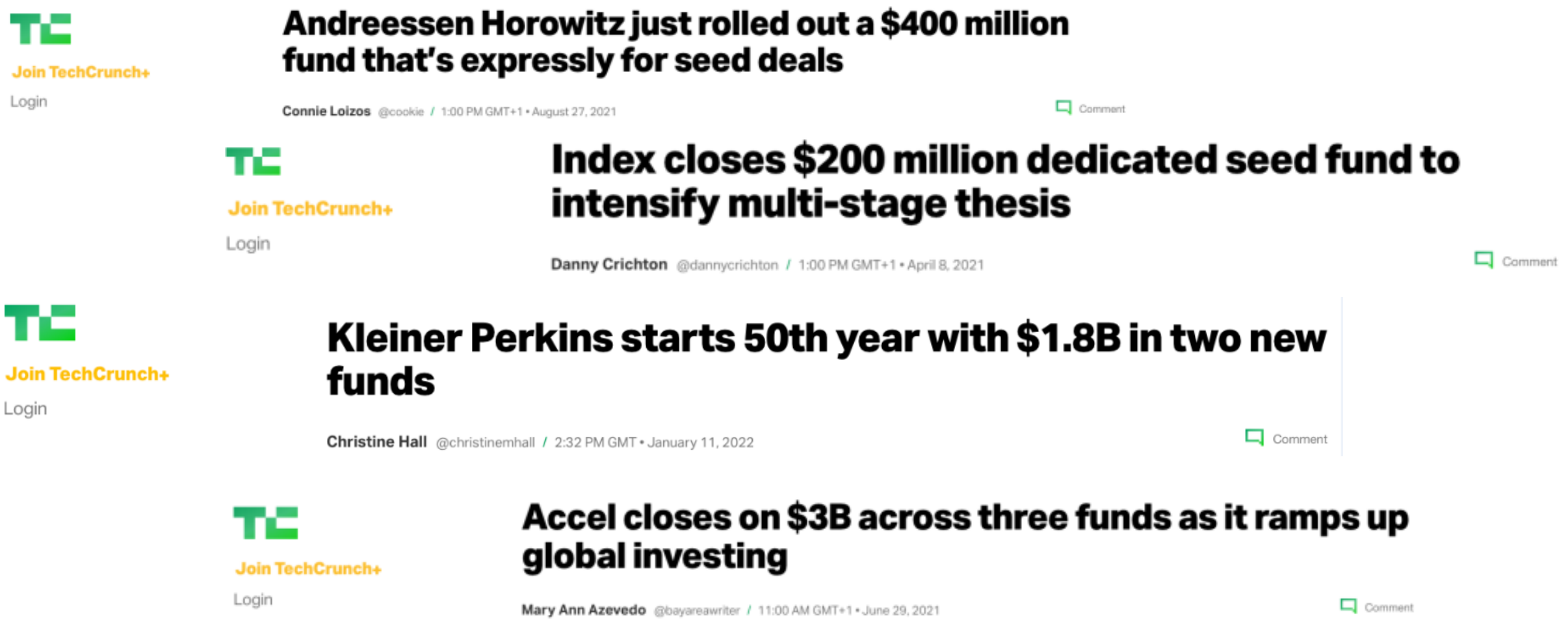
What we do

- We use novel data from nearly 2,000 start-ups applying for investment to a Seed VC ("Fund")
- Collect administrative data from start-ups' filings with UK business register
- For identification, we exploit the Fund's process to select applicants for due-diligence
- Main finding: assignment to due-diligence leads to growth, even for non-portfolio companies
- Additional evidence points to *venture improvements,* rather than certification

- Main implications: information and other growth frictions exist, however due-diligence by VCs helps reduce them. Therefore, role of VCs is broader than previously acknowledged

Setting: the Fund

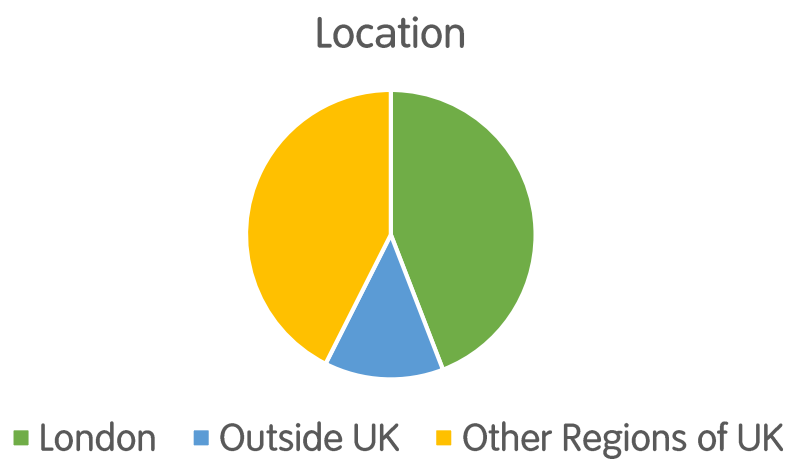
- Seed Fund in the UK established in 2016 and focusing on software

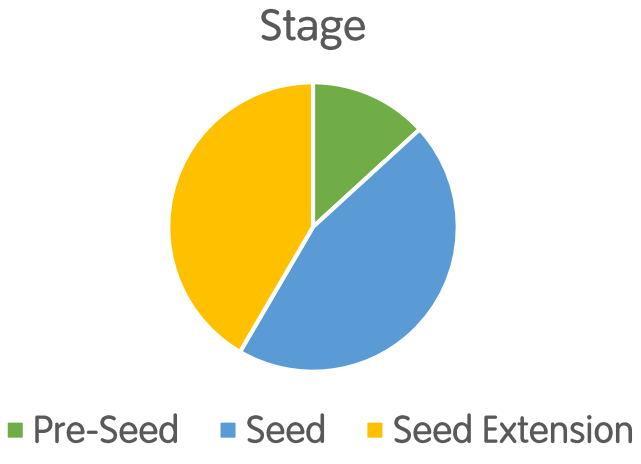


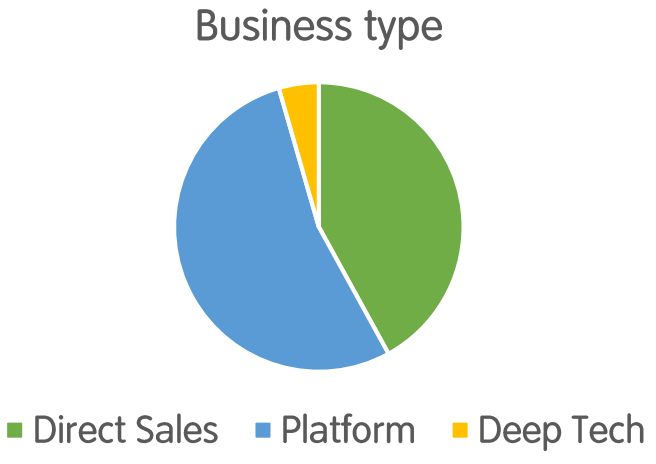
Applicants

- Seed Fund began investing in 2017 and by November 2019 ~2000 applicants

	Mean	Sd	p5	P25	P50	P75	p95	N
Age Business (since incorporation)	2.61	2.96	0.00	1.00	2.00	4.00	7.00	1,953
Female Founder	0.13	0.33	0.00	0.00	0.00	0.00	1.00	1,785
Target Amount (£1000s)	1,692	2,537	100	365	1,000	2,000	5,500	1,950
Target Close Date (Days)	80	70	25	48	70	96	165	1,946
Total Addressable Market (£Billion)	345	1725	0.02	1.00	8.00	50	1,000	1,435
Total Serviceable Market (£ Billion)	45	269	0.00	0.08	0.50	3.45	80	1,435







Outcomes – Administrative (CH—UK only)

	Mean	Sd	p5	P25	P50	P75	p95	N
Before Application								
Asset (£1000s)	641	15,635	0.00	0.00	23.13	167	1,044	1,548
Equity Issuance (£1000s)	158	608	0.00	0.00	0.00	83	850	1,548
No. of Years Before App.	2.67	2.67	0.00	1.00	2.00	4.00	8.00	1,548
After Application								
Asset (£1000s)	1,066	18,470	0.00	1.00	86	545	3,199	1,548
Equity Issuance (£1000s)	385	933	0.00	0.00	0.00	255	2,387	1,548
Survival	0.81	0.40	0.00	1.00	1.00	1.00	1.00	1,548
Liquidation	0.04	0.19	0.00	0.00	0.00	0.00	1.00	1,548
No. of Years After App.	1.93	0.64	1.00	2.00	2.00	2.00	3.00	1,548

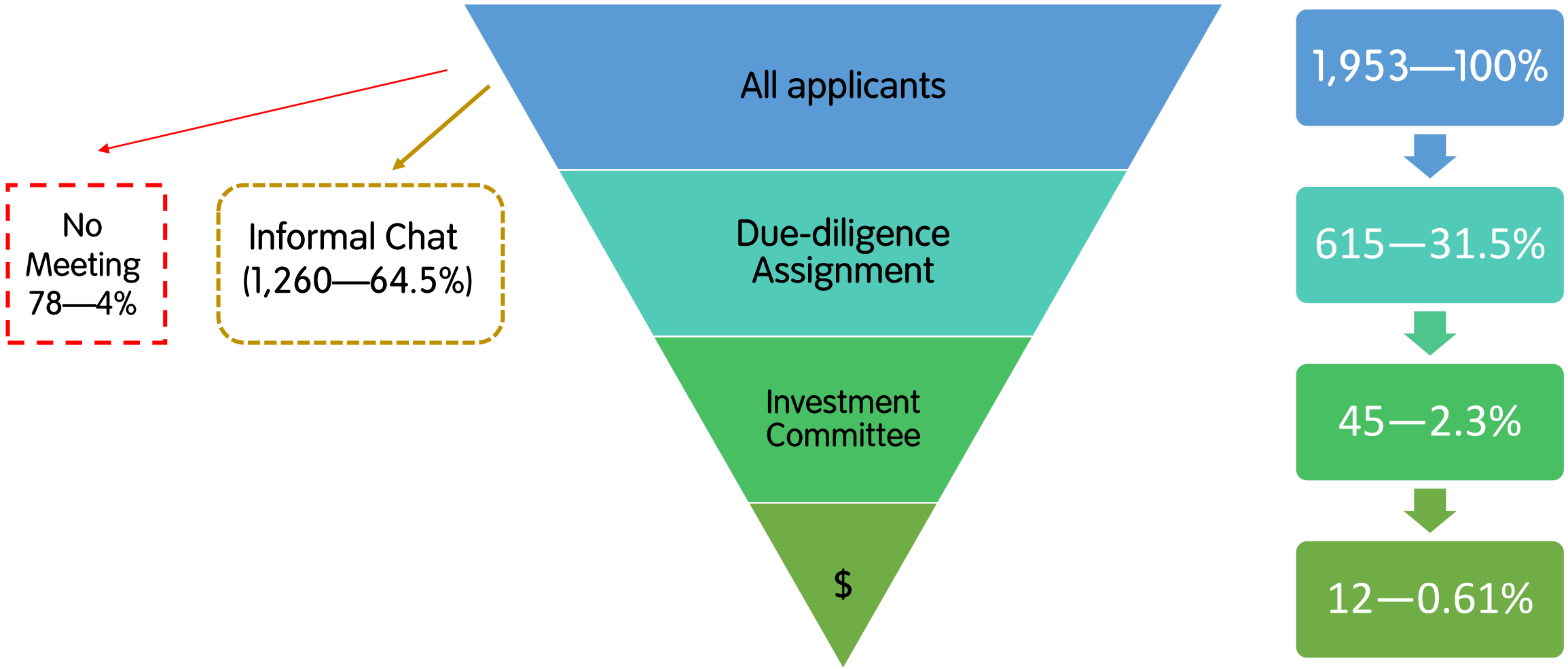
*Equity Issuance includes institutional and other sources

Outcomes – Web-based

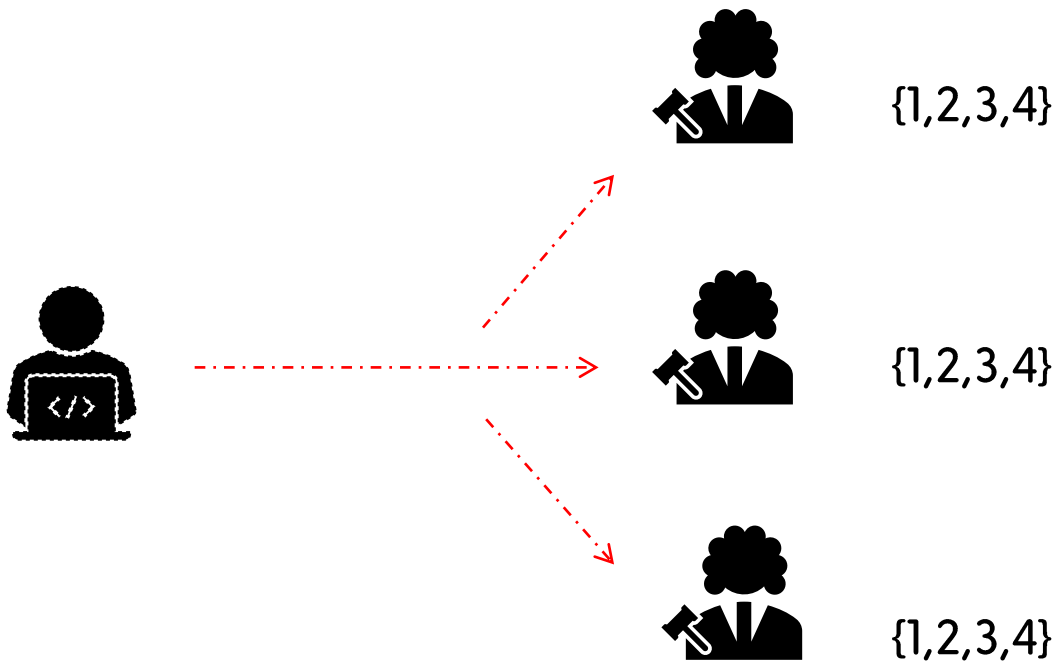
	Mean	Sd	P5	P25	P50	P75	P95	N
Before Application								
Funding rounds	0.47	1.06	0.00	0.00	0.00	0.00	3.00	1,953
Total funding ($1000s)	306	1,105	0.00	0.00	0.00	0.00	2,000	1,953
Number of Investors	0.83	2.48	0.00	0.00	0.00	0.00	5.00	1,953
No. of Years Before App.	2.61	2.96	0.00	1.00	2.00	4.00	7.00	1,953
After Application								
Funding rounds	1.28	1.90	0.00	0.00	0.00	2.00	5.00	1,953
Total funding ($1000s)	1,330	3,362	0.00	0.00	0.00	698	8,634	1,953
Number of Investors	1.02	1.19	0.00	0.00	1.00	2.00	3.00	1,953
Number of Employees	6.09	11.38	1.00	1.00	2.00	7.00	27.00	1,953
No. of Years After App.	1.90	0.64	1.00	1.00	2.00	2.00	3.00	1,953

*Equity Issuance includes institutional sources (source: Linkedin and Crunchbase)

Selection Funnel



(1) Random Allocation to Reviewers

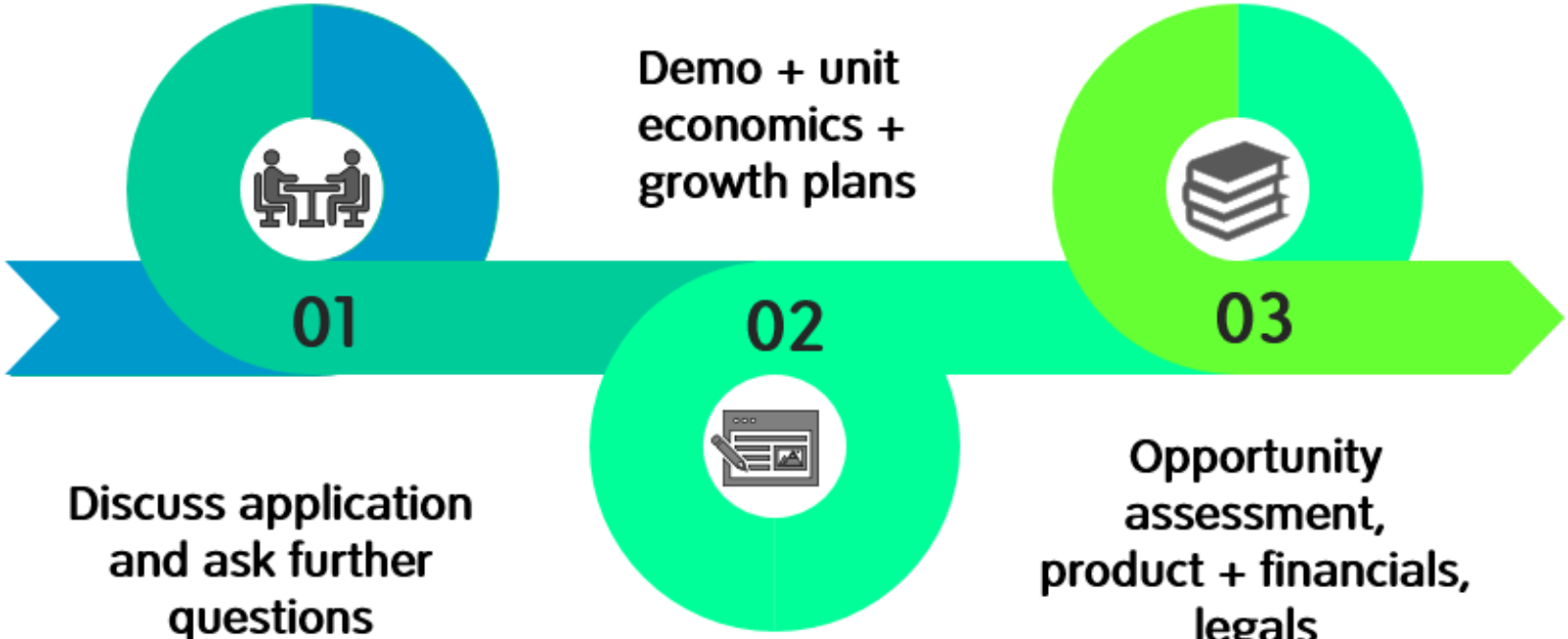


- Applications are randomly allocated to three internal reviewers, conditional on location
- Consistent with random allocation, we show that applicants have similar attributes across reviewers
- There are 12 reviewers, with 448 (553) mean (median) reviews and 30 (796) min (max)
- Each reviewer assesses independently the application, records comments and scores
- Mode score is 2, but reviewers vary in generosity: some tend to provide higher scores than others

(2) Selection Rules

				Average Score	Pre—May 2018	Post—May 2018	
						London	Outside
1	1	1	1	1.00	No Meeting	No Meeting	No Meeting
2	1	1	2	1.33	Informal Chat	Informal Chat	Informal Chat
3	1	1	3	1.67	Informal Chat	Informal Chat	Informal Chat
4	1	2	2	1.67	Informal Chat	Informal Chat	Informal Chat
5	1	1	4	2.00	Due diligence	Due diligence	Due diligence
6	1	2	3	2.00	Informal Chat	Informal Chat	Informal Chat
7	2	2	2	2.00	Informal Chat	Informal Chat	Informal Chat
8	1	2	4	2.33	Due diligence	Due diligence	Due diligence
9	1	3	3	2.33	Due diligence	Informal chat	Informal Chat
10	2	2	3	2.33	Informal Chat	Informal Chat	Informal Chat
11	1	3	4	2.67	Due diligence	Due diligence	Due diligence
12	2	2	4	2.67	Due diligence	Due diligence	Due diligence
13	2	3	3	2.67	Due diligence	Informal Chat	Informal Chat
14	1	4	4	3.00	Due diligence	Due diligence	Due diligence
15	2	3	4	3.00	Due diligence	Due diligence	Due diligence
16	3	3	3	3.00	Due diligence	Informal Chat	Due diligence
17	2	4	4	3.33	Due diligence	Due diligence	Due diligence
18	3	3	4	3.33	Due diligence	Due diligence	Due diligence
19	3	4	4	3.67	Due diligence	Due diligence	Due diligence
20	4	4	4	4.00	Due diligence	Due diligence	Due diligence

Entrepreneurs



Investors

Baseline

$$Y_i = \gamma + \rho Due\ diligence_i + \boldsymbol{Z}_i + \varepsilon_i \qquad (1)$$

- Where Y_i is the post-application outcome for applicant *i*, $Due\ diligence_i$ indicates the due diligence assignment and $\boldsymbol{Z}_i$ is a vector of controls
- Empirical challenge: due diligence selection by the Fund is endogenous
- Ideally find a variable that affects due diligence assignment but does not affect post-application outcomes through any other mechanism

Due Diligence Assignment Probability

- We exploit the random assignment of reviewers and the selection rules as joint sources of exogenous variation in due diligence assignment

- We define the "Due diligence Assignment Probability" (DAP) for each applicant i as:

$$DAP_i = p^1_{1(-i)}p^1_{2(-i)}p^1_{3(-i)}f(1,1,1) + p^1_{1(-i)}p^2_{2(-i)}p^1_{3(-i)}f(1,2,1) + \cdots + p^4_{1(-i)}p^4_{2(-i)}p^4_{3(-i)}f(4,4,4)$$

- For example, $p^4_{1(-i)}$ denotes the probability that reviewer 1 gives a score of 4 based on all other reviewed applicants except i

- $f(s_1, s_2, s_3)$ is the due-diligence selection rule

Empirical model

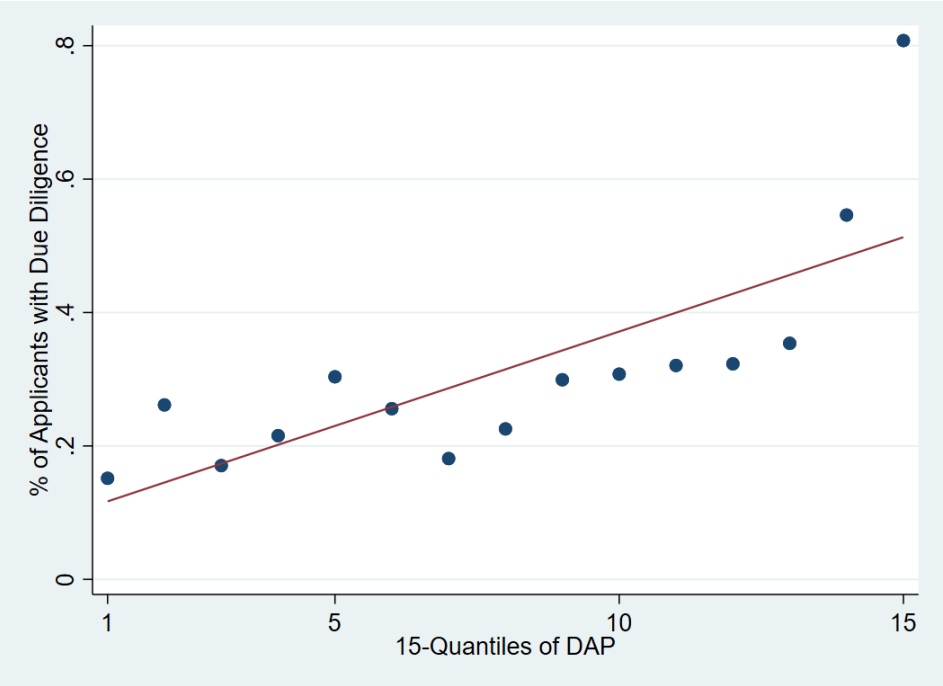
$$Due\ diligence_i = \mu + \beta DAP_i + \boldsymbol{Z}_i + e_i \quad (3)$$

$$Y_i = \theta + \rho Due\ \widehat{diligence}_i + \boldsymbol{Z}_i + \omega_i \quad (4)$$

- ρ measures the LATE of due-diligence assignment under three identification assumptions:

1) DAP is associated with due diligence
2) DAP only impacts outcomes through due diligence assignment
3) The impact of DAP on due diligence assignment is monotonic

First Stage: Due diligence and DAP

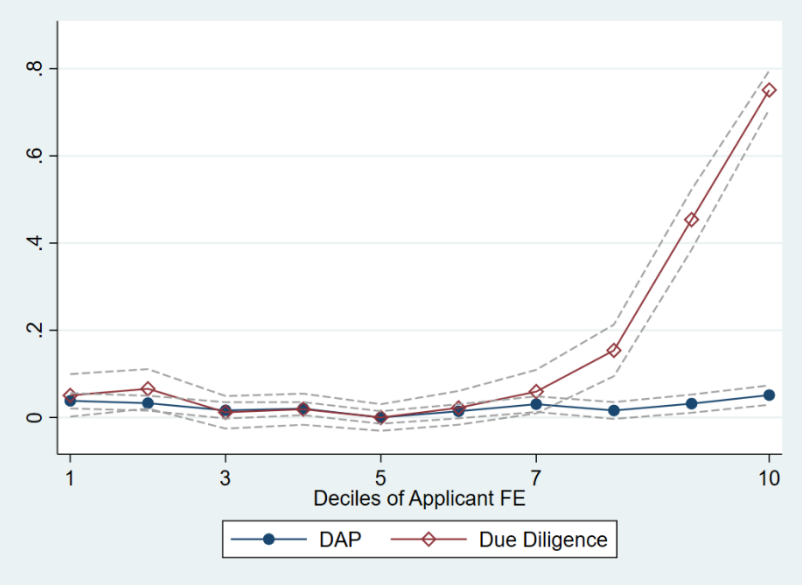


$$Due\ diligence_i = \alpha + \beta DAP_i + \boldsymbol{Z}_i + e_i$$

	(1)	(2)	(3)	(4)
DAP	1.09***	1.33***	0.94***	1.19***
	(0.08)	(0.07)	(0.07)	(0.06)
Applicant FE			0.35***	0.37***
			(0.02)	(0.01)
F-test of excl. IV	185.64	31.64	26.45	
Controls		Yes	No	Yes
Observations	1,953	1,953	1,953	1,953

Exclusion restriction

Conditional independence



Balance co-variates across DAP Quartiles

Variable	Q1	Other Q	P-value	Q2	Other Q	P-value	Q3	Other Q	P-value	Q4	Other Q	P-value
App. Info.												
Age	2.44	2.67	**0.96**	2.52	2.63	**0.97**	2.57	2.62	**0.99**	2.91	2.51	**0.95**
Female Founder	0.14	0.13	**0.97**	0.14	0.12	**0.96**	0.13	0.13	**0.99**	0.10	0.14	**0.91**
Target Amount (£1000s)	1438.5	1778.1	**0.89**	1911	1619.2	**0.91**	1594	1725.2	**0.96**	1831.4	1647	**0.94**
Target Close Date (Days)	84.11	78.18	**0.93**	80.21	79.5	**0.99**	77.68	80.35	**0.97**	76.62	80.68	**0.95**
Total Addressable Market (£Billion)	517.67	286.74	**0.89**	232.52	381.61	**0.93**	342.08	345.76	**1.00**	284.56	364.94	**0.96**
Total Serviceable Market (£ Billion)	62.02	39.3	**0.93**	32.96	48.96	**0.95**	48.83	43.73	**0.98**	35.97	48.03	**0.96**
Location/Stage/Business Type:												
London	44.74%	43.93%	**0.99**	44.06%	44.16%	**0.99**	45.73%	43.60%	**0.97**	41.96%	44.84%	**0.95**
Outside UK	14.98%	12.75%	**0.95**	17.42%	11.95%	**0.87**	10.16%	14.37%	**0.90**	10.65%	14.18%	**0.92**
Other Regions of UK	31.58%	35.85%	**0.93**	31.15%	35.97%	**0.92**	35.37%	34.57%	**0.99**	41.13%	32.70%	**0.86**
Pre-Seed	16.15%	12.21%	**0.91**	12.28%	13.52%	**0.97**	10.59%	14.07%	**0.92**	13.77%	13.02%	**0.98**
Seed	45.80%	45.02%	**0.99**	43.53%	45.78%	**0.96**	47.75%	44.38%	**0.95**	43.79%	45.68%	**0.97**
Seed Extension	38.05%	42.77%	**0.92**	44.20%	40.70%	**0.94**	41.67%	41.55%	**1.00**	42.44%	41.29%	**0.98**
Direct Sales	41.50%	42.16%	**0.99**	47.22%	40.25%	**0.89**	40.13%	42.61%	**0.96**	39.10%	42.95%	**0.94**
Platform	52.98%	53.73%	**0.99**	48.11%	55.36%	**0.88**	57.62%	52.19%	**0.91**	55.51%	52.89%	**0.96**
Deep Tech	5.52%	4.10%	**0.95**	4.68%	4.39%	**0.99**	2.24%	5.20%	**0.89**	5.39%	4.15%	**0.95**
CH Info. Before App.												
Asset (£1000s)	1736.8	266.6	**0.93**	276.8	752.7	**0.98**	200.96	794.05	**0.97**	324.39	747.36	**0.98**
Debt (£1000s)	1750.6	221.74	**0.92**	173.24	745.42	**0.97**	125.4	780.03	**0.97**	365.81	693.41	**0.98**
Annual Equity Issuance (£1000s)	169.58	154.64	**0.98**	178.8	152.18	**0.97**	142.86	163.87	**0.97**	144.17	163.25	**0.97**
Web Info. Before App.												
Number of Funding Rounds	0.45	0.47	**0.98**	0.43	0.48	**0.97**	0.51	0.46	**0.96**	0.48	0.46	**0.99**
Total Funding ($1000s)	274.09	317.4	**0.97**	346.45	293.12	**0.96**	307.85	305.97	**1.00**	297.62	309.31	**0.99**

- We deploy several tests in support of exclusion restriction

Results: VC funding of non-portfolio companies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(Funding)		ln(# Rounds)		ln(# Investors)		ln(Equity Issuance) (UK)	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Due diligence	2.86***	2.74**	0.19***	0.18**	0.10***	0.09*	1.13***	1.11*
	(0.37)	(0.86)	(0.02)	(0.06)	(0.02)	(0.04)	(0.18)	(0.44)
N	1941	1941	1941	1941	1941	1941	1537	1537
R-sq	42.76%	41.38%	3.25%	0.10%	1.38%	0.68%	24.81%	20.86%
Reference:								
P75	13.46		1.10		1.10		6.24	

*Magnitude: £142,000

***Size of due diligence effects on non-portfolio companies is at least a third of the size of investment effects on portfolio companies**

How can VC due diligence add value to startups?

Type Discovery

Type Improvement

** Due diligence selection conveys positive signal to market -> start-up has more resources -> start-up growth

- Certification
- Validation

** Entrepreneurs acquire information and resources through due diligence -> startup growth

- Learning-by-doing
- Coaching
- Networks

Evidence points to Type improvement

- Against certification: no web traffic-effects + similar effects across businesses with different type uncertainty
- Against validation: no effect on survival

- New fund from (experienced) GP
- Due-diligence assignment is private

- Changes in ventures' "technology stacks" within 12 months of application

- Consistent with Fund's perceptions from interviews

Conclusions: What do we learn?

- First rigorous evidence that VC due-diligence can be a key driver of start-up performance even for start-ups involved in failed fundraising campaigns
- The main implication is that entrepreneurs face information and other growth frictions that can be mitigated by VCs' due-diligence
- Therefore, VCs have a broader impact on innovation than previously acknowledged
- Broader impact appears first-order
- In terms of external validity, our findings are most representative of young seed VCs