

# Impact Investing and Venture Capital Industry: Experimental Evidence

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# Motivation

The private market attracts significant impact investing capital (38% AUM)

Knowledge in the public market might not be generalized to the private market.  
(different firm compositions; investment strategies and settings)

Specifically, important ESG challenges might be best addressed by new firms through innovation

— crucial to examine whether impact ventures have fundraising advantages in the private market.

**This paper:** focus on the venture capital industry

**Research Question:** How do startups' ESG characteristics influence VCs' expectations of startups' financial performance and investment decisions?

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# Empirical Challenges

## Ambiguous answers based on theories

- (Positive) Doing well by doing good + LPs' ESG preference
- (Negative) Cost of CSR is higher for financially-constrained firms

## Data Limitations

- Standard databases generally record completed deals
  - Matching equilibrium outcomes
  - Seldom observe VCs' portfolio selection and evaluation process
  - Hard to find exogenous variation in *startup-level* ESG characteristics
- ESG Measurements Issues
  - Unlike public firms, startups lack a matured ESG rating system.

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# This Paper

- I. (Experiment) a. Real US VCs evaluate multiple hypothetical startup profiles with randomized ESG characteristics to match with real startups  
(incentive: real investment opportunities)
- b. Anonymous donation game (measure social preference)

Results: VCs face a tension between financial and non-pecuniary motives

Financial motive (-): lower **expectation** of attractive impact ventures' profitability

Non-pecuniary motive (+): preference supporting impact ventures

**Financial motive** dominates → lower interest in impact ventures

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II. (Outcome Test) further assess the accuracy of VCs' expectations by checking impact ventures' post-funding financial performances

Results: Once invested, impact ventures demonstrate superior ex-post performance, suggesting under-investment due to market frictions

III. (Dynamic Bayesian Model) Given the unique staging financing strategies used by VCs, a model is used to

— Analyzes how this tension between financial and non-pecuniary motives affect VCs' impact investment

— Policy Implications

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# Literature & Contribution

## 1. Literature on Impact Investing in the Private Market

Barber, Morse, and Yasuda (2020), Kovner and Lerner (2015), Jeffers, Lyu and Posenau (2021), Cole, et al. (2020), etc

This paper: how VCs evaluate impact ventures (a tension between financial vs non-pecuniary motivation, and its implications)

## 2. Experimental and Survey Literature on Sustainable Finance

Riedl and Smeets (2017), Heeb, et al. (2021), etc

This paper: IRR experiment in VC-startup setting (beliefs, preference)

## 3. Corporate Social Responsibility (CSR) Literature

Hong, Kubik and Scheinkman (2012), Colonnelli and Gormsen (2020), etc

This paper: impact ventures' financial performance and fundraising situation

## 4. Entrepreneurial Finance Literature

Bernstein et al. (2017), Kaplan et al. (2009), etc.

This paper: startups' ESG characteristics matter.

# Overview

Experiment

Outcome Test

Theory & Policy Implications

Conclusion

# Experimental Design

**(Real world Setting):** "ML Matching Tool", collaborate with real US incubators

**(Design)** Real US VCs are recruited to evaluate 16 randomized startup profiles, which they know to be hypothetical, to match with real startups (**incentive**)

**Orthogonally** randomized startup characteristics (ESG, traction, etc.)

## Startup 1

### Founding Team

Founder	Margaret Liang (graduated from Stanford University in 1983) Amanda Thao (graduated from Massachusetts Institute of Technology in 1989)
Previous Experience	Yes, the team has at least one serial entrepreneur.
Founded date	2016

### Project Description

Competitive advantage	Economies of scale
Traction	Not generating revenue yet

### Additional Information

Company Category	B2C
Number of Employees	0-10
Target Market	Domestic Market
Mission	For profit
Location	U.S.
Number of Existing Investors	1

**"Profit-driven Ventures" vs "Impact Ventures"**



\*Assume that all the hypothetical startups work in the industry (or industries) and stage(s) of your interest.

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# I. Experimental Design

## Mission

- Control Group: "For profit" (25%)
- Treatment1 Group: "For profit, consider IPO within 5 years" (25%)
- Treatment2 Group: "Besides financial gains, also care about the social and environmental impact" (50%)

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# Sample Selection

(Sample size) comparable to  
Kessler, Low and Sullivan (2019)

roughly 70 US VCs, 1200+ startup  
profiles evaluated (2020.03-08)

(Representativeness)

- representative in terms of industry distribution
- similar ESG-related historical investments compared to investors in Pitchbook
- more active, more exits

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# Key Design Features

## A. Evaluation Questions

### 1. Mechanism Questions

Profitability ▶ Q<sub>1</sub>; Availability ▶ Q<sub>2</sub>

### 2. Decision Questions

Contact interest ratings ▶ Q<sub>3</sub>; Intended investment amount ▶ Q<sub>4</sub>

## B. Incentive Structure

1. Matching Incentive - all investors [Kessler, Low and Sullivan \(2019\)](#)

2. Monetary Incentive - random subset [Armona, Fuster and Zafar \(19\)](#)  
(use future performance data to verify evaluation accuracy)

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# Donation Game

## Measure social preference

Thank you for completing the questionnaire. We will offer you a \$15 Amazon Gift Card within 2 days. However, you can also choose to donate a proportion of this \$15 our  $\{e://Field/racegender\}$  startup club to show your support. Your donation decision is completely anonymous and will not be disclosed to anyone. We will use your donated money to purchase a small gift for one of our  $\{e://Field/racegender\}$  startup founders.

(For example, if you donate \$5 to the club, we will send you a \$10 Amazon Gift Card within 2 days and use the donated \$5 to purchase a small gift for a  $\{e://Field/racegender\}$  startup founder in our incubators to give them your anonymous encouragement.)



Please select how much you wish to donate.

▼



## Experimental Results (Financial Motives)

Confirm quantile-regression results when using OLS to examine attractive startups (lower expectations of profitability; lower contact interest ratings)

Effect of Attractive Startups' ESG Characteristics on Investors' Evaluation ( $\hat{Q}_3 > 50$ )

Dependent Variable	Q1	Q1	Q3	Q3
	Profitability	Profitability	Contact	Contact
	(1)	(2)	(3)	(4)
	All	Profit-driven	All	Profit-driven
	Investors	Investors	Investors	Investors
Has ESG Characteristics	-2.94*	-2.90*	-2.98**	-3.63***
	(1.49)	(1.58)	(1.22)	(1.30)
Has IPO Plan	-0.72	-0.90	-3.09**	-3.08**
	(2.13)	(2.29)	(1.41)	(1.47)
Investor FE	Yes	Yes	Yes	Yes
Observations	671	600	671	600
R-squared	0.39	0.38	0.43	0.45

## Validity of the IRR Experiment

Significant correlations between VCs' evaluations and real-world investment portfolios exist (mainly for attractive startups' evaluations)

Dependent Variable	1( <i>Prefer ESG</i> )	1( <i>Prefer ESG</i> )	ESG Attitude
	OLS (1)	Probit (2)	OLS (3)
<i>Panel A: Evaluations of Attractive Startups (<math>\hat{Q}_3 \geq 50</math>)</i>			
Fraction of ESG Startups in Portfolio Companies	1.16*** (0.39)	4.33* (2.54)	19.95* (10.77)
Observations	61	61	61
R-squared	0.051	0.046	0.035
<i>Panel B: Evaluations of All Startups</i>			
Fraction of ESG Startups in Portfolio Companies	-0.06 (0.65)	-0.16 (1.63)	25.77 (23.57)
Observations	68	68	68
R-squared	0.000	0.000	0.020

## Experimental Results (Non-pecuniary Motives)

ESG Preferences are positively correlated with investors' social preferences — consistent with [Riedl and Smeets \(2017\)](#)

Correlation Between Investors' Attitudes Towards ESG and Investors' Donation Behaviors

Dependent Variable	Donate or Not	Donate or Not	Donate All or Not	Donate All or Not	Donation Amount	Donation Amount
	Probit (1)	Probit (2)	Probit (3)	Probit (4)	OLS (5)	OLS (6)
ESG Attitude ( $\beta$ )	0.02** (0.01)	0.03** (0.01)	0.03** (0.01)	0.03** (0.01)	0.04** (0.01)	0.04** (0.01)
Control	No	Yes	No	Yes	No	Yes
Observations	70	70	70	70	70	70
R-squared	0.06	0.08	0.07	0.09	0.08	0.10

## II. Outcome Test

### Identify impact ventures

**Step 1:** ESG-related keywords in descriptions of startups' business models and industry backgrounds (Pitchbook)

**Step 2:** two RAs independently manually verify the classification

### Three measures of startups' performance

- a. Raise a new round of VC investment (short-run)
- b. Out of business (short-run)
- c. Successful Exits (medium-run)



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If investors **under-invest** in impact ventures in the pre-selection stage, then impact ventures have better post-funding performance

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	Raised New Funding Short run 1 yr.		Out of Business Short run 1 yr.		Successful Exits Medium run 2.5 yr.	
	(1)	(2)	(3)	(4)	(5)	(6)

---

### *Panel A. Global Startups*

Has ESG Characteristics	0.044*** (0.008)	0.039*** (0.007)	-0.020*** (0.005)	-0.018*** (0.005)	0.009*** (0.003)	0.007** (0.003)
Observations	50,646	50,646	50,646	50,646	50,646	50,646
R-squared	0.06	0.16	0.07	0.08	0.07	0.09
Control	No	Yes	No	Yes	No	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Stage FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: better ex-post performance does NOT indicate impact ventures' higher profitability before selection

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# III. Dynamic Bayesian Model

## Purpose of the Model

- Illustrate how the tension between financial and non-pecuniary motives affect impact investment in VCs' staging financing setting
- How miscalibrated beliefs hinder impact investing

## Key Elements of the model

Built on the theoretical framework in Bohren, Imas and Rosenberg (2019)

- Beliefs/Expectations against impact ventures get updated with new information in each investment round
- Preference towards impact ventures does not change with new information

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# Policy Implications

**Proposition 1:** As the signal becomes perfectly accurate, any differential treatments are only driven by taste parameters.

**Implication:** Role of fintech/big data/rating technology (info asymmetry)

**Proposition 4:** Preference-driven support has two effects:

direct influence (+)

backfire channel (–, reduce profitability expectations)

**Implication:** Harm of greenwashing

# Conclusion

- (Experiment) VCs face a tension between financial and non-pecuniary motives
  - lower expectations of attractive impact ventures' financial returns
  - ESG preference towards impact ventures

Financial motives dominate, leading to lower contact interest ratings in impact ventures

- (Outcome Test) Better post-funding performance, suggesting under-investment in impact ventures
- (Model) Implications of this tension in VCs' staging financing setting and policy suggestions

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## Acknowledgement

*Thank You*

# Evaluation Questions ( $Q_1$ )

1. Imagine that Jeffrey Chen and David Zheng's team is guaranteed to accept your investment offer. Compared with firms you have previously invested in, which percentile do you feel this startup belongs to considering its quality?

Extremely Low Quality

0

10

20

30

40

50

60

70

80

90

100

Extremely High Quality

Probability of Generating Higher Return (**Drag the bar**)



## Evaluation Questions (Q<sub>2</sub>)

2. Considering the potential network and negotiation power of Jeffrey Chen and David Zheng's startup team, what's the probability that this startup team will accept your investment offer rather than that of another investor (Angel, VC, Loans, etc)?

Guaranteed Rejection

0

10

20

30

40

50

60

70

Guaranteed Acceptance

80

90

100

Probability of Accepting Your Offer (**Drag the bar**)



## Evaluation Questions (Q<sub>5</sub>)

5. Compared with your previous invested startups, which percentile do you feel this startup belongs to considering its risk level (i.e. the level of uncertainty of achieving the expected finance returns)?

No risk

0      10      20      30      40      50      60      70      80      90      100

Highest risk

Risk Level (**Drag the bar**)



## Evaluation Questions (Q<sub>3</sub>)

3. If you consider both the team's attractiveness and their likelihood of collaboration, how likely would you be to ask for their contact information or pitch deck?

Will Not Ask

0      10      20      30      40      50      60      70      80      90      100

Will Ask

Probability of Asking for More Information (**Drag the bar**)



## Evaluation Questions (Q<sub>4</sub>)

4. Considering both the team's attractiveness and their likelihood of collaboration, how much money would you invest in this startup compared to your average investment amount? Imagine that the startup asks for the amount of money that you can afford.

(For example, if your average amount of investment per deal is \$1M and you would invest \$0.5M to the team, drag the bar to 0.5.)

