The Allocation of Socially Responsible Capital

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Env Climate discussion group S43

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1 Introduction

2 The model

3 Empirical evidence

Research goals

1. develop a theoretical framework to explore how socially motivated investing creates social value
   - focus on strategies based on portfolio composition:= financial returns v.s. social value creation
   - distinguish between values-aligned and impact-aligned investing
   - values-aligned: their financial returns + social value of the firm they finance
   - impact-aligned: their financial returns + consequences of their investment decisions for total social welfare
2. conduct a laboratory experiment: elicit social preferences and test the main implications

Main intuition

Values-aligned strategies are inefficient:

(i) Firm A generates a 6% profit and 10 units of social value.
(ii) Firm B generates a 6% profit and 12 units of social value.
(iii) Firm C generates a 4% profit and 9 units of social value.

- Values-aligned investors compete to finance A and B
- they offer a lower rate to B bcf higher social value
- e.g. A: 5%=commerical rate, B: 3% (equalizing A & B), c: no financing

Fail to generate social value as A & B could have been commercially financed:
$\Longrightarrow$ Competition between commercial and social investors displaces commercial investors and thus limits social investor impact.

From B to C: a deviation that increases not only impact but also financial returns. (getting 4% and no displacement)

Setup

- E entrepreneurs, endowed with a project that requires one unit of capital
- S social investors, allocating one unit of capital
- commercial capital: elastically supplies at R^C
- contract between investor and entrepreneur i: transfer of 1 unit capital in exchange for return r_i
  entrepreneur receives a share of profits $\pi_i - r_i$
  w_i social value is created
- Baseline: complete information
- social investors have the option to allocate their capital to a social value neutral asset at r^C and $w = 0$.

Other info

Preference

Values-aligned social investor i: $r_i + \theta_i w_i$ where θ_i (in the ascending order) represents the strength of investor i's social preference

Impact-aligned social investors: $$r_i + \theta_i \sum_{j \in \bar{E}} w_j = (r_i + \theta_i w_i) + \theta_i \sum_{j \in \bar{E} \setminus i} w_j,$$

Timing

1st stage (offer): social investors offer contracts to entrepreneurs and all firms receive an offer for commercial financing at rate r^C

2nd stage (acceptance): entrepreneurs choose at most one contract to accept and payoffs are realized.

Equilibrium: pure-strategy subgame perfect equilibrium

Social welfare: $W = \sum_{i \in \bar{E}} w_i$, $\bar{E}$: the set of enterpreneurs receiving financing

Model result 1: only values-aligned investors

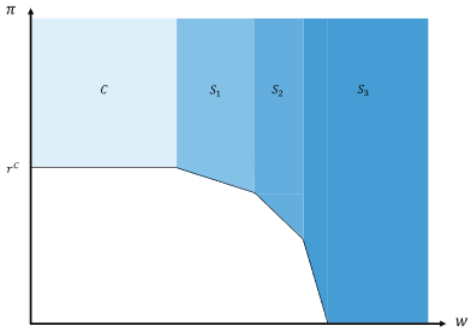

Figure 1. Equilibrium investment with values-aligned social investors. (Color figure can be viewed at wileyonlinelibrary.com)

In equilibrium, investors with the highest altruism finance enterprises with the highest social value. And the cost of capital is decreasing in an entrepreneur's social value.

Model result 2: only impact-aligned investors

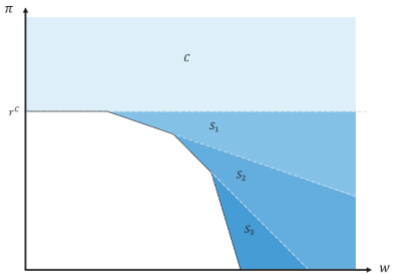

Figure 2. Equilibrium investment with impact-aligned social investors. (Color figure can be viewed at wileyonlinelibrary.com)

So long as social capital is sufficiently scarce, impact-aligned investors do not finance commercially viable entrepreneurs regardless of their social value.

When social investors are impact-aligned, they exhibit a form of negative assortative matching in equilibrium. (Among firms with a fixed level of profits π, the higher is the social investor's altruism parameter θ_i, the lower is the social value w_i of the firm they support)

Model result 3: both types exist

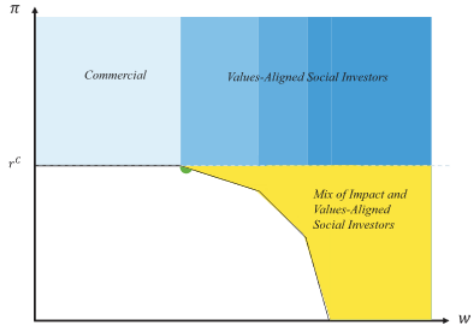

Figure 3. Equilibrium investment with both types of social investors. (Color figure can be viewed at wileyonlinelibrary.com)

Both results hold from previous cases:

Values-aligned: positive assortative matching

Impact-aligned: finance the rest with negative assortative matching

Enterprise Impact

How should one judge the contribution to social welfare of a particular entrepreneur, sometimes referred to as enterprise impact?

This paper argues: a firm's enterprise impact should also account for the social value of the capital it employs.

> We define the enterprise impact of firm i to be $e_i \equiv w_i - v_i$, where v_i is the social value of capital attributable to the investor who supports entrepreneur i in equilibrium. We define the enterprise impact for firms that do not receive financing to be zero. Enterprise impact e_i corresponds to the change in total social value created in equilibrium from adding firm i to the market.

An alignment between a firm's enterprise impact and profitability:

Increasing the profitability of the firm makes it more likely to attract commercial capital, freeing up capital that is willing to accept lower returns to fund higher social-value endeavors

Incomplete information

profits and social value, respectively. Entrepreneurs have private information about their true type, $(\pi^i, w^i) \in \{\pi^L, \pi^H\} \times \{w^L, w^H\}$, with $\pi^H > r^C > \pi^L$ and $w^H > w^L$. Public signals thus map into probabilities of being high-profit and high social-value types. Without loss of generality, we normalize $w^L = \pi^L = 0$ and $w^H = \pi^H = 1$ and thus interpret π_i and w_i as the probabilities of firm i being a high-profit type and a high social-value type. We assume that for all firms i, $\pi_i \in (0, 1)$, so that every firm has a positive probability of being a high-profit type or low-profit type. As in Section I, we make no assumption about the joint

In the absence of impact-aligned social capital, each firm i will receive financing if and only if $\pi_i = \pi_H$

The probability that an impact-aligned social investor is pivotal in financing a given firm i is $1\pi_i$, the probability the firm is the low-profit type.

Whenever impact-aligned investors offer financing, they do so at rate $r_i = \pi_L$.

Model result 4: Incomplete information

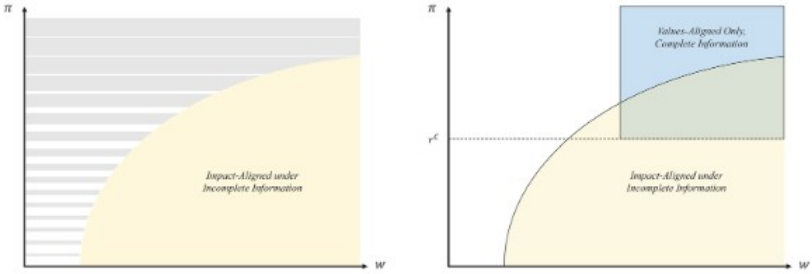

Figure 4. Allocation of capital with incomplete information. (Color figure can be viewed at wileyonlinelibrary.com)

Main message

Under incomplete information, the behavior of impact-aligned social investors resembles that of values-aligned social investors in the model with complete information.

Incomplete information about profitability affects investors' ability to assess whether their investment would be pivotal and thus generate social value.

In practice, many social investors finance projects that deliver both high profit and high social value does not necessarily imply that these investors are employing values-aligned strategies — consistent with the efficient creation of impact in the face of uncertainty about their own pivotality.

survey

- 400 respondents –¿ 389 (failed any of the three attention checks)
- Prolific online survey and experiment platform
- US-based with financial investments in the stock market
- make stock choices, e.g.

Consider the following scenario of two options for a stock to purchase:

	Company A Stock	Company B Stock
Your Financial Return	$3.00	$3.50
Company's Charitable Donation	$1.00	$0.50
Donation Requires Your Investment	No	Yes

Which stock would you prefer to buy? **Company A** or **Company B**?

Figure 5. Example of laboratory experiment question. (Color figure can be viewed at wiley-onlinelibrary.com)

Willingness to Pay for Impact Alignment and Values Alignment

To this end, we use the pairwise choice data from our experiment to estimate preferences over values and impact alignment, accounting for heterogeneity in preferences across latent classes. We assume that the utility of individual j owning stock k is given by

$$u_{j,k} = \beta^r_{c_j} r_k + \beta^v_{c_j} w_k + \beta^i_{c_j} w_k p_k + \epsilon_{j,k},$$

where r_k is the return of the stock, w_k is its social value (charitable donation), and p_k is an indicator of whether the investor needs to purchase this stock for a charitable donation to occur. Further, c_j is the latent class in which individual j is a member and preference parameters β are class-specific. Each individual j has an ex ante probability π_c of belonging to class $c \in 1, .., C$. We assume that idiosyncratic taste shocks $\epsilon_{j,k}$ follow a Type I extreme value distribution.

(latent class logit model)

Result 1

Table 1

Estimation of Willingness to Pay for Social Attributes of Stocks in a Laboratory Experiment

This table reports estimates of the latent class logit model of willingness to pay and estimated class shares. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Class 1	Class 2	Class 3
WTP Values	0.197***	0.724***	0.060
	(0.020)	(0.053)	(0.048)
WTP Impact	0.166***	−0.167***	0.903***
	(0.018)	(0.058)	(0.045)
Class Share	0.368	0.288	0.344

find significant heterogeneity in investors' preferences

Are Investors Making Mistakes?

- compare the stated social preferences of investors in our survey to the preferences revealed by their choices in our investment scenarios
  $\Rightarrow$ yes, evidence from both priors and posterior class membership from the model
- ask follow-up questions of participants:
  - point out that the participant could have earned at least as much money but generated more social impact by picking the other stock
  - ask if they'd change

Result 2

$\Rightarrow$ 59% of participants chose the values-aligned option in at least one of these six scenarios and therefore offered an opportunity to revise their decision.
$\Rightarrow$ 109 out of 231 revised their choice each time they were given an opportunity to do so.

Nearly half of the participants whose choices indicated values-aligned preferences may in fact have a preference for impact that is not reflected in their initial investment decisions.

The end!