

A Theory of Socially Responsible Investment

Martin Oehmke

London School of Economics

Marcus Opp

Stockholm School of Economics

May 2019

Outline

Two Questions:

Does socially responsible investment (SRI) make a difference?

If yes, how should scarce ethical capital be allocated?

Approach:

Equilibrium model of impact investing and divestment

Holmström-Tirole #XR

The Firm: Scale and Production

An entrepreneur (borrower) starts with initial resources of A .

Chooses firm scale:

- ▶ constant returns to scale
- ▶ scale I yields RI if investment succeeds, 0 otherwise

Chooses between clean and dirty production:

- ▶ dirty production entails per-unit social cost of ϕ_D
- ▶ clean production has lower social cost of $\phi_C < \phi_D$
- ▶ clean production requires higher per-unit initial investment $k_C > k_D$

Assumptions:

- ▶ D has higher financial return: $pR - k_D > pR - k_C$
- ▶ C has higher social return: $pR - k_C - \phi_C > pR - k_D - \phi_D$

The Firm: Agency Problem

Agency problem:

- ▶ probability of success is p_H if borrower works
- ▶ if borrower shirks, probability of success is $p_L = p_H - \Delta p$
- ▶ shirking yields private benefit of BI

Borrower's payoff:

- ▶ expected financial payoff
- ▶ private benefits
- ▶ social cost, borrower's concern captured by $\gamma^b \in [0, 1]$

$$U^b = \text{expected (net) financial payoff} + \text{private benefit} - \gamma^b * \text{social cost}$$

Outside Investors

There are **two types of risk-neutral (outside) investors**:

- ▶ all investors care about expected cash flow
- ▶ some investors also care about social cost of production

Unethical Investors:

- ▶ care only about financial returns ($\gamma^u = 0$)
- ▶ unethical capital is abundant

Ethical Investors:

- ▶ care about financial returns and social cost ($\gamma^e > 0$)
- ▶ ethical capital is scarce, total amount κ
- ▶ coordinated (e.g., one large ethical fund)

$$U^i = \text{expected (net) financial payoff} - \gamma^i * \text{social cost}, \quad i \in \{u, e\}$$

Benchmark: No Ethical Investors

Suppose that:

- ▶ borrower undertakes project $j \in \{C, D\}$ at scale I_j^u
- ▶ unethical investors are promised a total repayment of XI^u

Entrepreneur's **IC constraint:**

$$p_H(R - X)I_j^u \geq p_L(R - X)I_j^u + BI_j^u \iff X \leq R - \frac{B}{\Delta p}$$

Investors' **IR constraint:**

$$p_HXI_j^u \geq k_jI_j^u - A \iff I_j^u \leq \frac{A}{k_j - p_HX}$$

Binding IC and IR determine firm scale.

Benchmark: No Ethical Investors

Firm scale under project j :

$$I_j^u = \frac{A}{\xi - \pi_j}$$

- ▶ $\xi = p_H \frac{B}{\Delta p}$: agency cost per unit of investment
- ▶ $\pi_j = p_H R - k_j$: per-unit financial return of project $j \in \{C, D\}$

Because **dirty technology has higher financial payoff** ($\pi_D > \pi_C$),

$$I_D^u > I_C^u$$

Borrower **prefers dirty production technology** if:

$$(\xi - \gamma^b \phi_D) I_D^u - A > (\xi - \gamma^b \phi_C) I_C^u - A$$

⇒ Even **ethical borrower** may choose **dirty project**

Can Ethical Investors Act as Impact Investors?

Ethical investor concern \Rightarrow they can **increase scale** of clean firm

Unethical investors' IR constraint:

$$p_H X^u I_C^u - (k_C I_C^u - A) \geq 0 \iff I_C^u \leq \frac{A}{\xi - \pi_C}$$

Ethical investors' IR constraint:

$$p_H X^e I_C^e - k_C I_C^e - \underbrace{\gamma^e \phi_C (I_C^u + I_C^e)}_{\text{social cost of clean investment}} \geq \underbrace{-\gamma^e \phi_D I_D^u}_{\text{counterfactual social cost}} \iff I_C^e \leq \frac{\tilde{A}}{\xi - (\pi_C - \gamma^e \phi_C)},$$

Reduction in social cost acts like an **asset to borrower**:

$$\tilde{A} = \gamma^e (\phi_D I_D^u - \phi_C I_C^u)$$

The Minimum Ethical Stake

Borrower chooses **clean project** if:

$$(\xi - \gamma^b \phi_C)(I_C^u + I_C^e) - A \geq (\xi - \gamma^b \phi_D)I_D^u - A$$

⇒ **Impact investing** requires **sufficient increase in scale**:

$$I_C^e \geq \frac{\xi - \gamma^b \phi_D}{\xi - \gamma^b \phi_C} I_D^u - I_C^u \equiv \underline{I_C^e}$$

Ethical investors can therefore **induce clean production** if

$$\bar{I}_C^e \geq \underline{I}_C^e$$

where

$$\bar{I}_C^e \equiv \frac{\tilde{A}}{\xi - (\pi_C - \gamma^e \phi_C)}$$

Impact Investing: Examples

Suppose that **borrower is unethical** ($\gamma^b = 0$):

- ▶ **Impact investing** is possible if it **makes up for lost scale**:

$$\bar{I}_C^e \geq I_D^u - I_C^u$$

(When $\gamma^b > 0$, partially making up for lost scale sufficient.)

- ▶ Requires that **ethical investors care sufficiently** about social cost:

$$\gamma^e \geq \frac{k_C - k_D}{\phi_D - \phi_C}$$

- ▶ **Coasian result** when $\gamma^e = 1$ and **abundant ethical capital**:

switch to clean production $\iff k_C - k_D < \phi_D - \phi_C$

Scarce Ethical Capital

Suppose there are **many firms**. Denote firm type by k with CDF $\mu(k)$.

In absence of impact investors, **aggregate social cost**

$$\int \phi_{D,k} l_{D,k}^u d\mu(k)$$

How should **scarce ethical capital** κ be allocated?

The Social Profitability Index

Payoff to ethical investors from **reforming firm k** :

$$\text{SocialNPV}_k = (\pi_{C,k} - \phi_{C,k} - \xi_k) \underline{I}_C^e + \phi_{D,k} I_{D,k}^u - \phi_{C,k} I_{C,k}^u$$

To maximize **impact per buck**, rank by social profitability index:

$$\text{SPI}_k = \frac{\text{SocialNPV}_k}{\underline{I}_C^e} = \underbrace{\pi_{C,k} - \phi_{C,k} - \xi_k}_{\text{clean social return net of agency cost}} + \underbrace{\frac{\phi_{D,k} I_{D,k}^u - \phi_{C,k} I_{C,k}^u}{I_{D,k}^u - I_{C,k}^u}}_{\text{return from eliminating counterfactual pollution}}$$

Invest in all firms for which $\text{SPI}_k \geq \overline{\text{SPI}}(\kappa)$

Divestment

A simple **corollary** on optimal divestment by ethical investors:

Divest all firms for which $I_C^e > \overline{I_C^e}$

- ▶ ethical investors have **no impact** on these firms

Divest all firms for which $SPI < \overline{SPI}(\kappa)$

- ▶ ethical investors have impact but **impact for buck too low**

Divestment based on most **existing SRI metrics generally inefficient**

Narrow SRI

Ethical investors with **narrow mandate**:

- ▶ internalize social cost of own investment
- ▶ but not counterfactual social cost in absence of investment

Ethical investors' **IR** constraint under **narrow SRI**:

$$p_H X^e I_C^e - k_C I_C^e - \underbrace{\gamma^e \phi_C (I_C^u + I_C^e)}_{\text{social cost of clean investment}} \geq \underbrace{0}_{\text{no counterfactual social cost}} \iff I_C^e \leq \frac{-\gamma^e \phi_C I_C^u}{\xi - (\pi_C - \gamma^e \phi_C)},$$

⇒ Narrow SRI **does not allow for increase in scale** beyond I_C^u

Related Literature

Theory: Heinkel, Kraus, Zechner (2001); Hart and Zingales (2017); Chowdry, Davies, Waters (2018); Davis and Van Wesep (2018); Morgan and Tumlinson (2018)

Empirical: Hong and Kacperczyk (2009); Chava (2014); Barber, Morse, Yasuda (2018)

Conclusion

Does socially responsible investment (SRI) make a difference?

Yes, even when unethical capital is abundant

- ▶ **co-investment** by **ethical impact investors** can reform firms.
- ▶ impact requires a **minimum ethical stake**.

How should scarce ethical capital be allocated?

Social Profitability Index consisting of

- ▶ social return (as captured by existing SRI metrics)
- ▶ agency rent
- ▶ counterfactual social cost