

Cutting out the Middleman: Crowdfunding, Efficiency, and Inequality

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Crowdfunding and crowdinvesting

- Crowd-financing: money directly from savers to borrowers/entrepreneurs (“many to one”)
 - Similar to market-finance except via web-platforms and not markets
 - Crowdfunding: either as donation/pre-sale (kickstarter) or debt-contract
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 - Crowdinvesting (also ‘equity crowdfunding’): buy part of a venture (companisto, crowdcube)
- Financial innovation made possible by the internet
 - Possibly cheaper than bank-finance
 - IPOs (market-finance) not affordable for small projects
 - ⇒ May help alleviate credit market imperfections, macroeconomic implications/growth
 - Downsides: moral hazard, fraud, adverse selection?

Example from crowdcube (UK)



The banner features a close-up of a hand holding a small, black, dome-shaped device. The device has the 'Vitality skin' logo in red and white. In the top right corner of the banner is a 'Follow' button with a star icon. The 'skin analytics' logo is in the bottom left, and the text 'SKIN ANALYTICS' is in the center.

skin analytics SKIN ANALYTICS Follow

EIS

Every 10 minutes someone dies from melanoma. Almost everyone should survive but often diagnosis comes too late. Skin Analytics makes screening of melanoma at home possible with a specially designed lens and phone app. Backed by Telefonica and Angels, the company has an existing partnership with Vitality UK, and is aiming for its new product to be a Class II medical device used by individuals and medical professionals.

<div style="background-color: #f1c40f; width: 50%; height: 10px; margin-bottom: 5px;"></div> 52%	Target	Equity	Investors	Days left
£238,270 raised	£450,000	23.45%	111	9

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- **Wealth and income distribution mismatch**: wealth distribution is more concentrated than income distribution
 - Saez & Zucman (2014): bottom 90% of American households owned about 23% of wealth, but received about 60% of income in 2012

Question and motivation

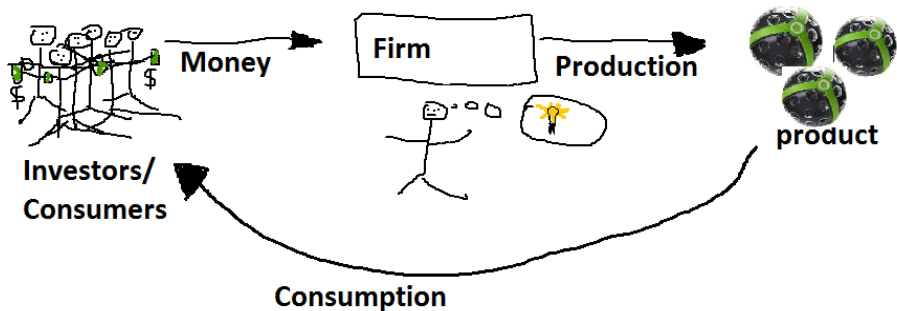
- We investigate the **consequences** of a **wealth and income distribution mismatch** on the **functioning of crowdf investing**
- **Wealth and income distribution mismatch**: wealth distribution is more concentrated than income distribution
 - Saez & Zucman (2014): bottom 90% of American households owned about 23% of wealth, but received about 60% of income in 2012
- Consequence: a **big share of consumers is not active on the capital market** (no financial wealth); capital misallocation?

Problem and main finding

- Purpose of the capital market: channel funds from savers (consumers) to lenders (entrepreneurs with new innovative products)
- New technology/product:
 - Consumer $i \in [0, 1]$ likes the new product or not, $\theta_i \in \{0, 1\}$
 - **Aggregate uncertainty** about how many consumers like the product: $s = \int_0^1 \theta_i di = 1 - \beta$ with prob $1/2$ and $s = \beta$ with prob $1/2$ (with $\beta > 1/2$)
- New company uses investments to produce the new product
- **Efficient capital allocation**: products that most consumers are interested in should get most funding (for production):

$$X(s = 1 - \beta) < X(s = \beta)$$

Problem and main finding



Problem and main finding

- How to achieve efficient capital allocation via crowdfunding: every interested consumer invests in products he would like to consume (vote analogy)
- Problem due to wealth/income distribution mismatch: not every interested consumer can invest; wealthy have to invest “on behalf” of the poor
- **Main finding:** efficient capital allocation is possible if and only if the income and wealth distribution of potential consumers matches
- **Equilibrium with sufficient wealth:** consumers invest in the new company if and only if they like the new product (for informational not brand-loyalty reasons)

Empirical implication

Example: iPhone holder for Lamborghini

- Pool of potential customers probably wealthy
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Hence crowdfunding should work better for Lamborghini iPhone holders than low-budget football shoes

Consequences of wealth inequality

- In most industrialized countries, wealth is far more concentrated than income
 - Hence many consumers cannot invest on the capital market due to wealth constraints
 - Investment flows on the capital market therefore reflect preferences of the wealthy, not necessarily future demand, with negative welfare consequences
- ⇒ not all socially beneficial projects are funded

Conclusion crowdfunding

- The Internet makes it possible to match a large number of investors with projects seeking funding at much lower cost than before
- Small firms now have access to equity finance when they could rely only on intermediaries before
- Thus, crowdfunding and crowdinvesting may be a valuable financial innovation, which can improve social welfare if the mismatch of wealth and income distribution is not too great

Timing and consumers

- Period 1 (Investment): use wealth to invest either at riskless rate $R \geq 1$ or in firm producing product x
- Period 2 (Consumption): use income and investment returns to consume product c or x

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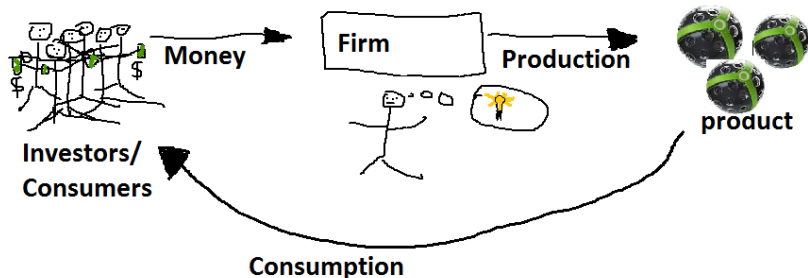
- Period 1 (Investment): use wealth to invest either at riskless rate $R \geq 1$ or in firm producing product x
- Period 2 (Consumption): use income and investment returns to consume product c or x
- Consumers have exogenous financial wealth $w_i \in \mathbb{R}_0^+$ in period 1 and exogenous income $y_i > 0$ in period 2
- Income $y_i > 0$ is sufficiently large, but w_i may be small/zero
- $\theta_i \in \{0, 1\}$: Consumers are interested in the new product x or not; private information

Consumers and preference distribution

- Two groups of consumers, wealthy $i \in [0, 0.5]$ and poor $i \in (0.5, 1]$
 - **Preferences within the same group are correlated**, share of consumers $1/2 < \beta < 1$ or share $1 - \beta$ are interested in product x
 - **Preferences between groups are independent** (wealthy learn nothing about preferences of poor from their own preferences)
 - **Aggregate demand uncertainty** as realization
 $(s_1, s_2) \in \{1 - \beta, \beta\}^2$
- ⇒ either few ($1 - \beta$), half, or many (β) consumers are interested in new product x

Investment in innovative firm

- Innovative firm needs capital for production of x
- Firm sells shares, modeled as “crowdfunding” campaign or direct public offering
- Production technology: Aggregate investment in firm linearly translates into supply
- Firm distributes all later earnings (from selling x) among all investors



Goods market equilibrium

- Investment determines production: If firm raises little capital, then only few units of x can be produced (low supply)
- If many consumers are interested in x , then there will be high demand for x
- Price p clears the market; higher price with more demand or lower supply
- p determines revenues of the firm, thus p is also per unit investment return

Efficiency and welfare

- **Efficient aggregate investment:** linearly increasing in the share of interested consumers in x
- Hence, the more consumers want to consume the good, the more has to be produced (requires larger investment in firm)
- Efficiency implies a state independent market clearing price $p = R$

The consequences of unequal wealth distributions

- Simple case: wealth among all consumers in same group is constant

Proposition

There exists an efficient equilibrium if and only if consumers in each group hold enough wealth to finance production of their own efficient consumption in case of $\theta_i = 1$, $w_i \geq (\alpha/R)^{1/(1-\alpha)}$.

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Proposition

There exists an efficient equilibrium if and only if consumers in each group hold enough wealth to finance production of their own efficient consumption in case of $\theta_i = 1$, $w_i \geq (\alpha/R)^{1/(1-\alpha)}$.

- If all consumers have enough wealth, then all interested consumers can invest, and aggregate investment increases with the share of interested consumers (efficient)
- If the poor do not have enough wealth, but do have income for consumption, then only inefficient equilibria exist
- The wealthy have to invest “on behalf” of the poor, but have no information about preferences of the poor

Adding financial intermediaries to the model

- Perhaps investment banks or venture capital firms could correct the inefficiency due to wealth inequality
- To investigate, we add a “financial sector” to the model with $N \geq 1$ investment funds
- Funds have no information about the preference distribution of consumers, but can acquire it from “market research” firms at a cost
- Funds have a big exogenous budget
- Funds can also invest at riskless rate R or in the innovative firm, and compete with crowdfunders on the market

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- Intuition: funds can fix inefficient investment only if they are informed, since efficient investment depends on the preference distribution
- But becoming informed is costly, which pays in equilibrium only if there is mispricing (implying excess returns)

The consequences of unequal wealth distributions

Corollary

There exists no equilibrium with an efficient state-dependent capital allocation if consumers of one group do not have enough wealth ($w_i < (\alpha/R)^{1/(1-\alpha)}$).

- Thus, even professional financial intermediaries do not fix the inefficiency due to wealth inequality
- Reasons are informational frictions or market power of funds

Extensions

The inefficiency due to wealth constraints is robust to . . .

- Introduction of forward markets / pre-order crowdfunding
- Dynamic investments / learning from investments
- Other utility functions