Cutting out the Middleman: Crowdinvesting, 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
  - Crowdinvesting (also ‘equity crowdfunding’): buy part of a venture (companisto, crowdcube)

Downsides: moral hazard, fraud, adverse selection?

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- 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?
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.

52% raise £238,270
capital goal £450,000
23.45%
111 investors
9 days left
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Wealth and income distribution mismatch: wealth distribution is more concentrated than income distribution.

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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

**Consequence**: a **big share of consumers is not active on the capital market** (no financial wealth); capital misallocation?
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: $s = \int_0^1 \theta_idi = 1 - \beta$ 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

Investors/Consumers → Money → Firm → Production → product
Consumption
Paper overview

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

⇒ every potential consumer can crowdinvest, hence crowdfunding can aggregate demand information
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  $\Rightarrow$ some interested consumers cannot participate in the investment stage about whether the project is funded
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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
- \[ \Rightarrow \] not all socially beneficial projects are funded
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 $\frac{1}{2} < \beta < 1$ 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 $(s_1, s_2) \in \{1 - \beta, \beta\}^2$
- $\Rightarrow$ either few $(1 - \beta)$, half, or many $(\beta)$ consumers are interested in new product $x$
Investment in innovative firm

- Innovative firm needs capital for production of $x$
- Firm sells shares, modeled as “crowdinvesting” 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 $\theta_i = 1$, $w_i \geq (\alpha/R)^{1/(1-\alpha)}$. 

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.
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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 crowdinvestors on the market
The impossibility of efficient investment with active funds

**Proposition**

*There exists no equilibrium with an efficient state-dependent capital allocation in which investment funds invest.*
The impossibility of efficient investment with active funds

Proposition

There exists no equilibrium with an efficient state-dependent capital allocation in which investment funds invest.

- 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.
The inefficiency due to wealth constraints is robust to...  
- Introduction of forward markets / pre-order crowdfunding  
- Dynamic investments / learning from investments  
- Other utility functions