Financing Efficiency of Securities-Based Crowdfunding

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Banque de France & Toulouse School of Economics
And for start-ups and small businesses, this bill [JOBS Act] is a potential game changer. Right now, you can only turn to a limited group of investors – including banks and wealthy individuals – to get funding. Laws that are nearly eight decades old make it impossible for others to invest. But a lot has changed in 80 years, and it’s time our laws did as well. Because of this bill, start-ups and small business will now have access to a big, new pool of potential investors – namely, the American people. For the first time, ordinary Americans will be able to go online and invest in entrepreneurs that they believe in.

—President Barack Obama, April 5, 2012

Signing the JOBS Act
Private Value versus Common Value Goods

- **Securities-based** crowdfunding is a new form of venture financing
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- Appeal founded on the success of rewards-based crowdfunding which has harnessed the wisdom of the crowd
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**Research Question:** Can securities-based crowdfunding be as successful as rewards-based crowdfunding?
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Our main finding is that the entrepreneur’s optimal offering cannot aggregate the wisdom of the crowd.

Ex post decision-making by the entrepreneur gives rise to a loser’s blessing which erodes investors’ incentives to contribute based on their private information in a truthful manner.
The Loser’s Blessing

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By the (strong) law of large numbers, 75% of investors receive a good signal if the project is good,

or, 25% of investors receive a good signal if the project is bad
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No incentive-compatible, truth-telling equilibria exist.
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- Entrepreneur has a risky project with investment capacity \( \overline{K} > 0 \)
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- Project is either type $G$ or type $B$ (equal probability)
- Chooses how to deploy raised investor capital ($K$) ($r$ or $s$)

$$V(K, F|r) = \begin{cases} \Delta 1_G K - K & K \leq \bar{K} \\ \Delta 1_G \bar{K} - \bar{K} & K > \bar{K}, \end{cases}$$

$$V(K, F|s) = 0 \ \forall K$$
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- $N \geq 2$ ex ante identical investors
  - Each investor receives free signal $\hat{F} \in \{\hat{G}, \hat{B}\}$
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    \Pr(F = G|\hat{G}) = \Pr(F = B|\hat{B}) = \alpha > \frac{1}{2}
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Securities-Based Crowdfunding

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Investors contribute $\kappa$ based on equilibrium strategies $g \in [0, 1]$ (for $\hat{G}$) and $b \in [0, 1]$ (for $\hat{B}$)
Entrepreneur’s Learning

- Contributed investor capital tells entrepreneur how many investors contributed \( n = \frac{K}{\kappa} \)
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- Contributed investor capital tells entrepreneur how many investors contributed \( n = K / k \).

- Entrepreneur updates beliefs based on number of contributions and forms posterior \( \rho(n, \bar{\pi}) \) in which \( \bar{\pi} \) are investors’ equilibrium contribution strategies.

\[
\rho(n, \bar{\pi}) = \frac{\Pr(n \cap G)}{\Pr(n \cap G) + \Pr(n \cap B)}
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- \( \Delta(n) \) maps to threshold number of contributing investors \( n \)
Entrepreneur’s Problem

\[
\begin{align*}
\max_{\kappa \in \mathbb{R}^+} & \quad E \left[ V(K, F | d) \right] \\
\text{s.t.} \quad & g_i \in \arg \max_{\hat{g} \in [0,1]} \Pi(\hat{G}, \{\hat{g}, \hat{b}\} | \overline{\pi}_{-i}, \kappa, n), \\
& b_i \in \arg \max_{\hat{b} \in [0,1]} \Pi(\hat{B}, \{\hat{g}, \hat{b}\} | \overline{\pi}_{-i}, \kappa, n), \\
& \Pi(\hat{G}, \overline{\pi}_i | \overline{\pi}_{-i}, \kappa, n) \geq 0 \text{ and } \Pi(\hat{B}, \overline{\pi}_i | \overline{\pi}_{-i}, \kappa, n) \geq 0, \\
& d = \begin{cases} 
  r & \text{if } n \geq n \\
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s.t. \( g_i \in \arg \max_{\hat{g} \in [0,1]} \Pi(\hat{G}, \{\hat{g}, \hat{b}\} | \bar{\pi}_- i, \kappa, n) \),

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\( d = \begin{cases} 
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**Definition:** First-best financing efficiency is characterized by,

(i) \( K \geq \bar{K} \) if \( n \geq n \),

(ii) and truthful reporting by each investor,

\( g = 1 \) and \( b = 0 \).
Risky Deployment Regions

Figure: Risky deployment regions with $N = 4$. 
Investor Incentive Compatibility

Invest based on signal $\hat{G}$ (i.e., $g = 1$):

\[
\sum_{n=n-1}^{N-1} \left( \alpha \Pr(n|G, \pi, N - 1) \frac{(\Delta-1)n}{n+1} - (1 - \alpha) \Pr(n|B, \pi, N - 1) \frac{n}{n+1} \right) \geq 0,
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Abstain based on signal $\hat{B}$ (i.e., $b = 0$):

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- $g = 1$ incentive compatible if $\Delta \geq \Delta_{n,\hat{G}}$
- $b = 0$ incentive compatible if $\Delta < \Delta_{n,\hat{B}}$
- $\Delta \in \left[ \Delta_{n,\hat{B}}, \Delta_{n,\hat{G}} \right] \Rightarrow$ Incentive compatibility region
Incentive Compatibility Regions

Minimum Number of Investors Needed for Risky Deployment

Figure: Incentive Compatibility regions.
Overlap

Minimum Number of Investors Needed for Risky Deployment

Figure: First-best regions.
Discussion

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- Financing Inefficiencies worsen as \( N \) increases:
  - Less likely that any individual investor is pivotal.
Discussion

Figure: Percentage of $\Delta$ that support first-best equilibria as a function of $N$ for $\alpha \in \{\frac{3}{5}, \frac{2}{3}, \frac{3}{4}\}$.
Extension with Price Setting

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Extension with Price Setting

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  - Higher offering price ⇒ better incentive compatibility
  - Higher offering price ⇒ fewer informed investors
Concluding Remarks

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- We show that the loser’s blessing erodes financing efficiency
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  - Rewards-based crowdfunding is efficient because investors buy benefits according to their private values
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  - Example, purchasing equity in a local micro brewery