Learning through Crowdfunding

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2017

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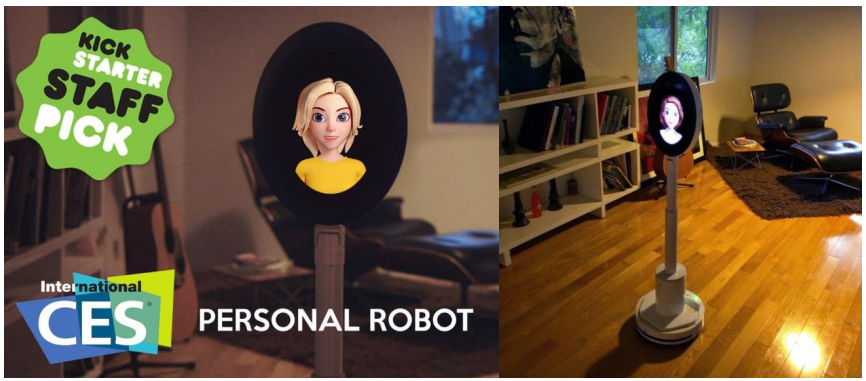
Example



PERSONAL ROBOT

Target: $50 000
Raised $161 537 (323%)

274 backers

Rewards:

$4 – 52 backers, “thank you”

$19 – 49 backers, “thank you” and T-shirt

91-99%

$995 – 86 backers (200 available), Pre-order

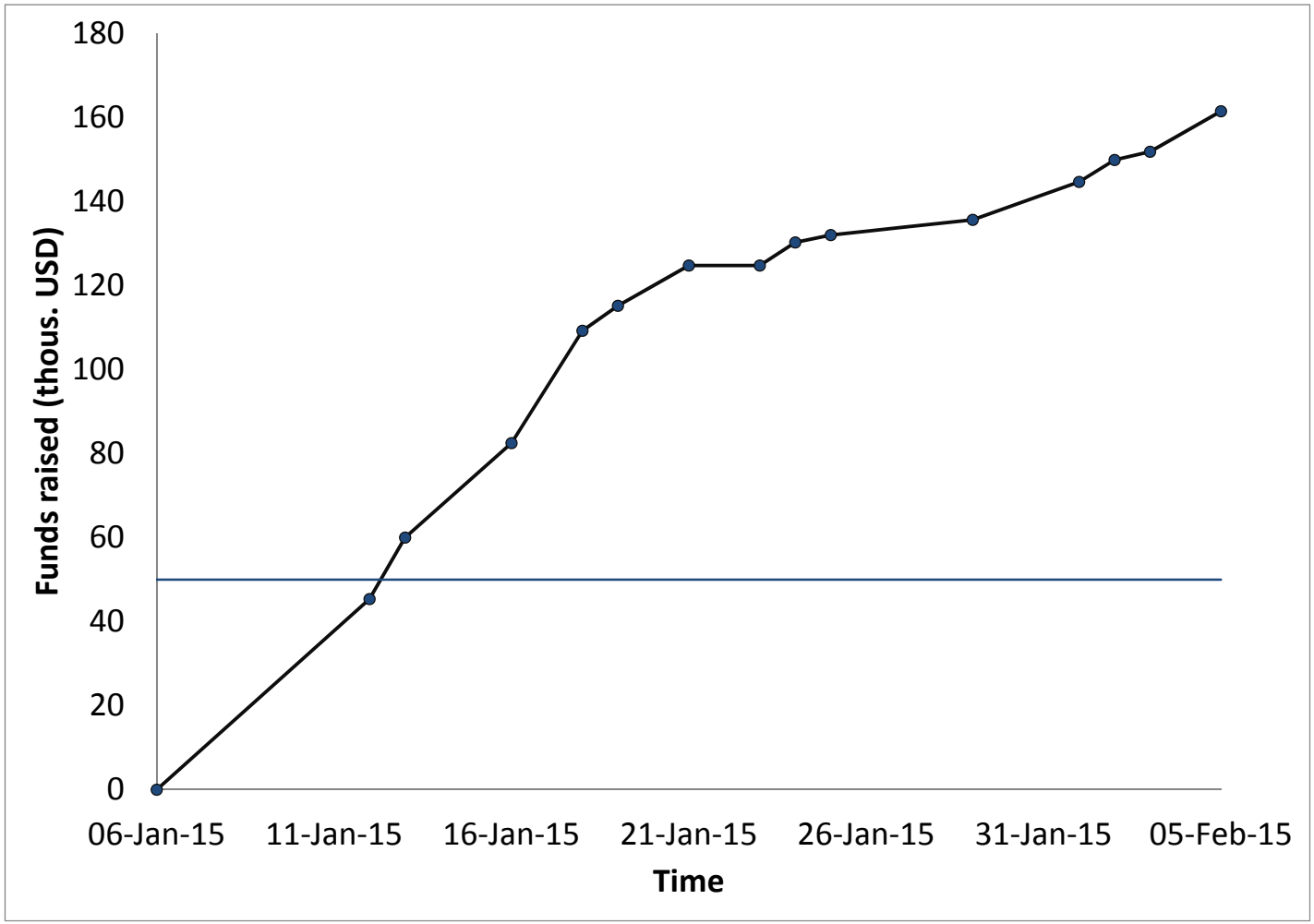
$995 – 23 backers (50 available), Pre-order special version (development kit)

$995 – 4 backers (10 available) Pre-order special version (research kit)

$1195 – 26 backers (31 available), Pre-order

$4975 – 1 (10 available), Pre-order 10 with company logo

Timing of backer contributions (Personal Robot)



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Questions

- What is the main source of value creation for firms and backers?
- Why restrict the pool of backers to future consumers?
- What are the characteristics of firms that benefit most?
- How can firms commit to deliver their products to future consumers?
- Why are third-party platforms needed?

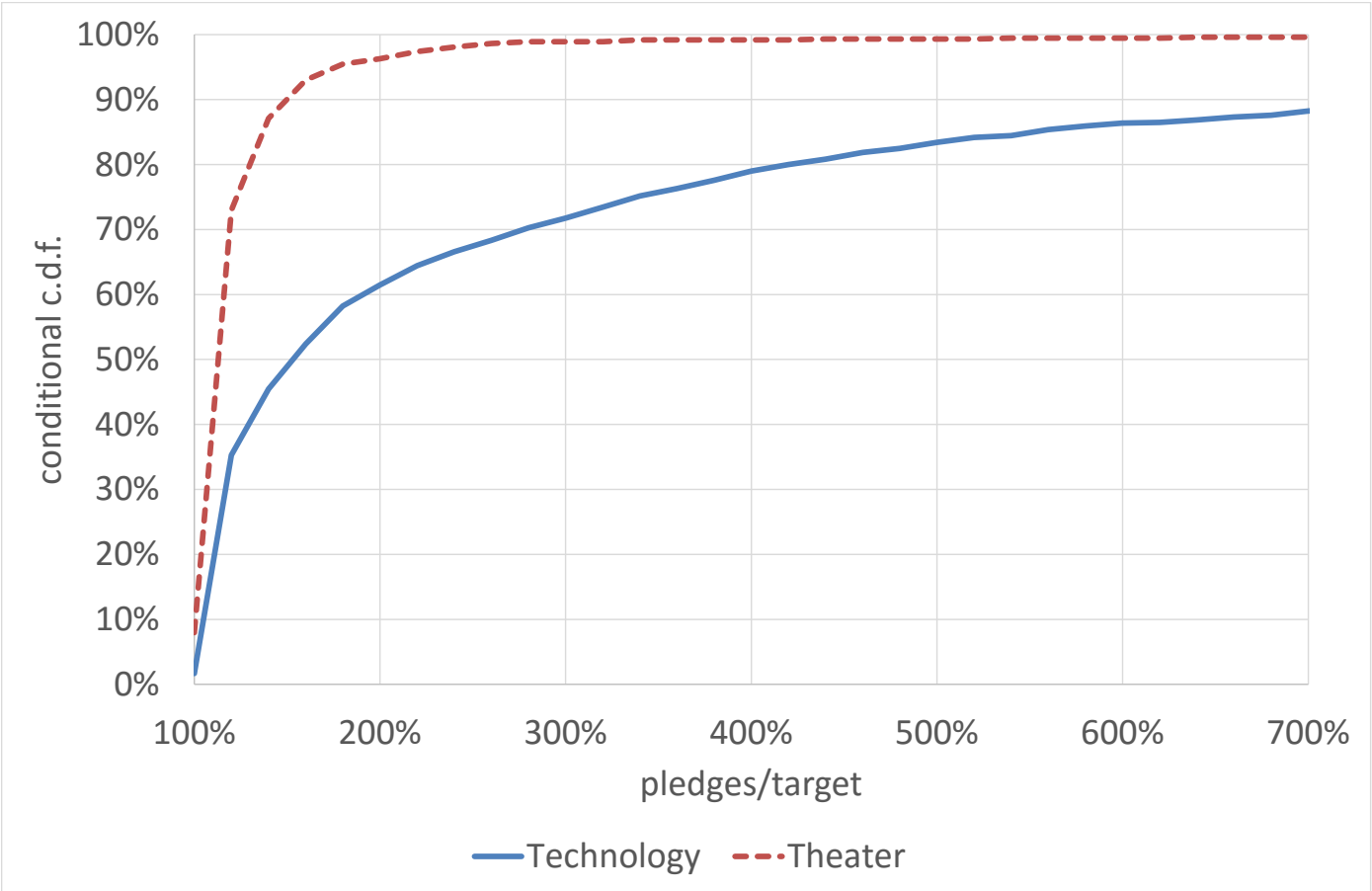
Sector and projects

- $5.5bn (2015) up from $4bn (2014),$19bn expected in 2021. (Massolution and Statista)
- Innovative consumer products (Technology, Design and Gaming) raise most funds - 61% of all funds collected; $55K-$90K per project compared to $21K overall average. (Kickstarter)
- Many projects raise funds comparable to VC/Angel investments - around 4000 projects raised over $100K; 240 projects raised over $1M. Pebble Technology $20.3M (2015), $10.3M (2012), $12M (2016). (Kickstarter)
- Average contribution per backer is noticeable - e.g., $200K on average of technology project. (Kickstarter)

Moral hazard

- Backers contribute during a fixed length campaign.
- Funds are passed on before the firm invests and delivers rewards.
- Nevertheless most projects deliver the rewards (Mollick 2014).

Successful theatre vs. technology projects.



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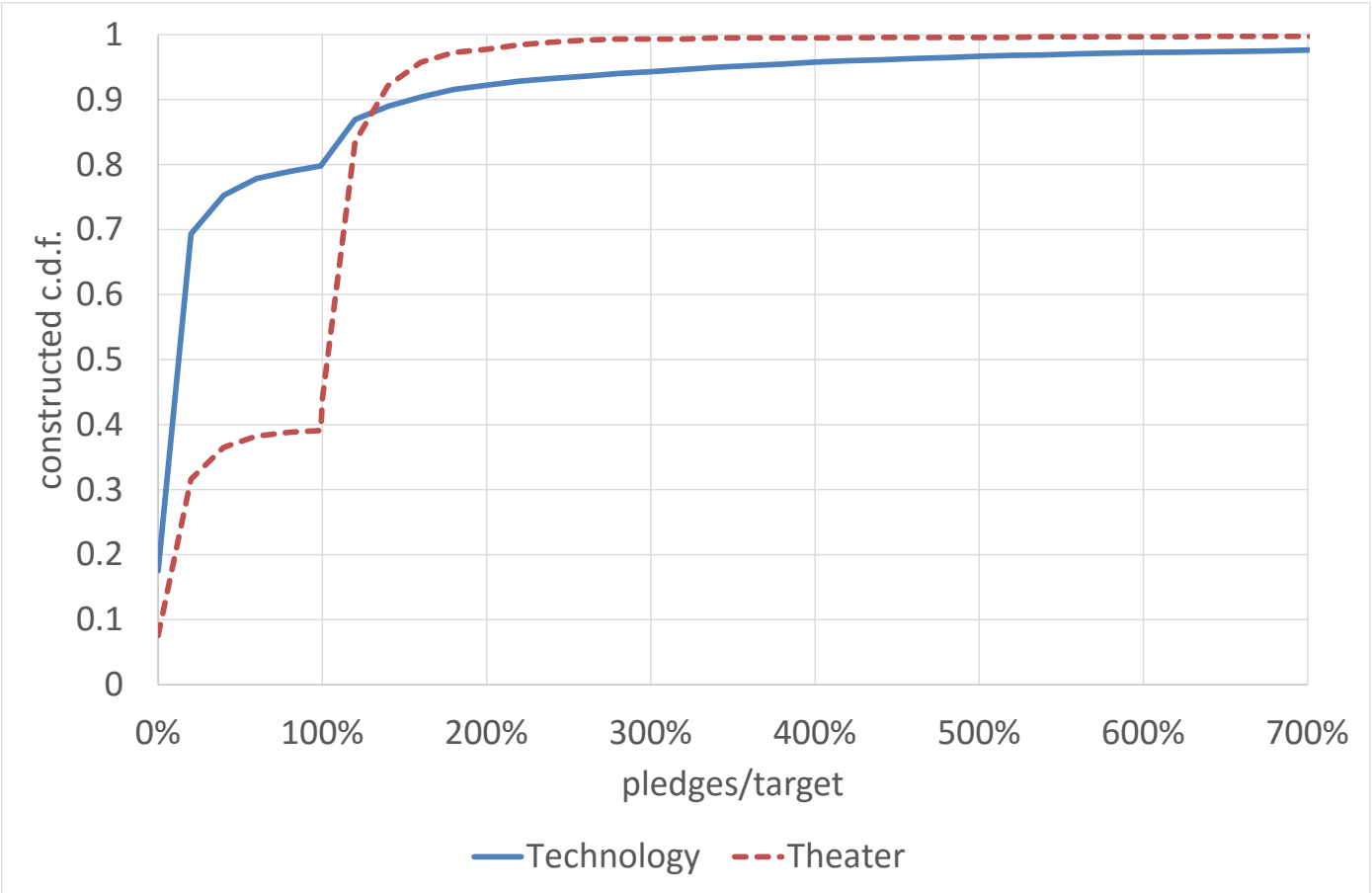
Overall theatre vs. technology projects.



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Our paper

- Reward-based crowdfunding enables firms to credibly **learn about demand**.
- Real option value of learning: better investment decisions.
- We derive the optimal scheme, analyze existing schemes.
- Value of learning mitigates moral hazard.
- We derive empirical predictions.

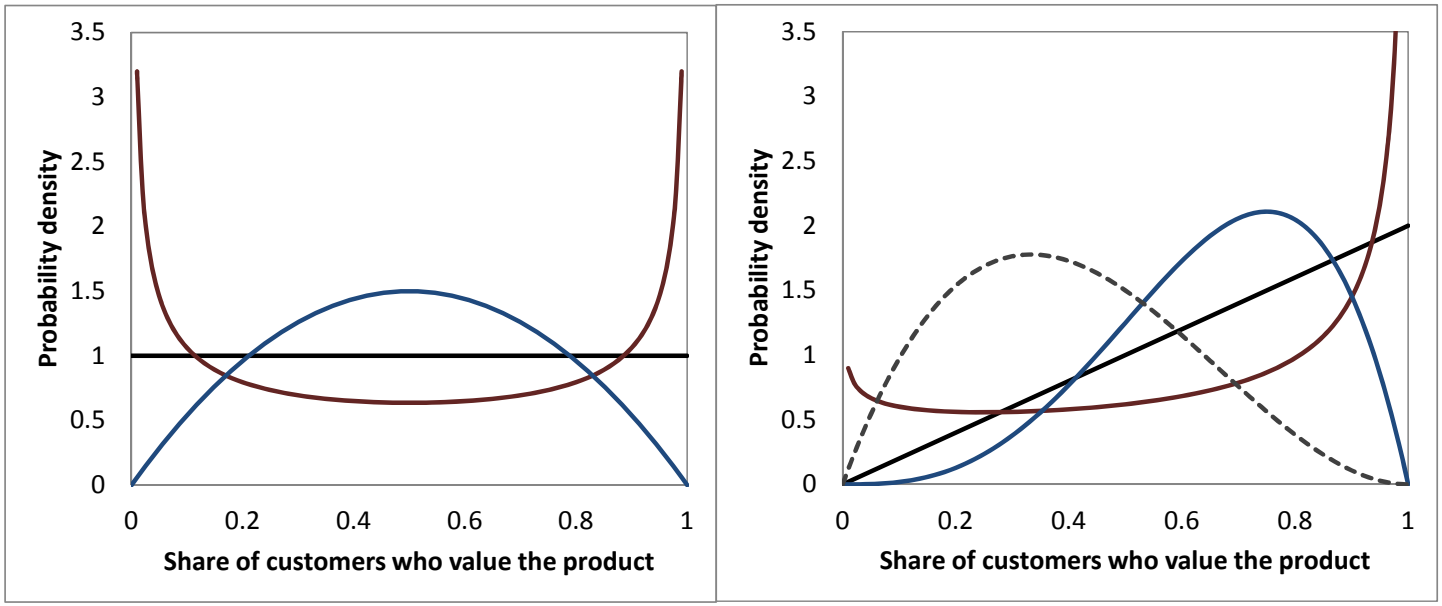
Alternative explanations

- Belleflamme, Lambert, Schwienbacher 2012 and Varian 2013 focus on backer preferences:
  - price discrimination - but products are often pre-sold at a discount.
  - backers are pivotal - but systematic oversubscription.
- Strausz 2016 and Ellman and Hurkens 2017 consider pre-selling, and contribute to debate about the importance of moral hazard.
  - preselling without "consumer survey" feature of crowdfunding - but innovative consumer products seem to benefit the most and credit constraints are not the main reason for participation.

Setting

- The firm has N potential consumers; fraction $\theta \in [0,1]$ has valuation 1 and $1-\theta$ has valuation 0.
- θ is unknown to the firm, prior distribution $\theta \sim Be(\alpha, \beta)$, where $\alpha = \lambda\theta_0$ and $\beta = \lambda(1-\theta_0)$.
- Many possible prior beliefs including uniform prior ($Be(1,1)$)

Examples of possible prior beliefs



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Setting

- All agents are rational and risk neutral, discount factor is $\delta < 1$.
- Crowdfunding at date 0.
- The firm decides whether to invest I at date 1.
- If the firm invests, it produces and sells at date 2.
- No credit constraints.

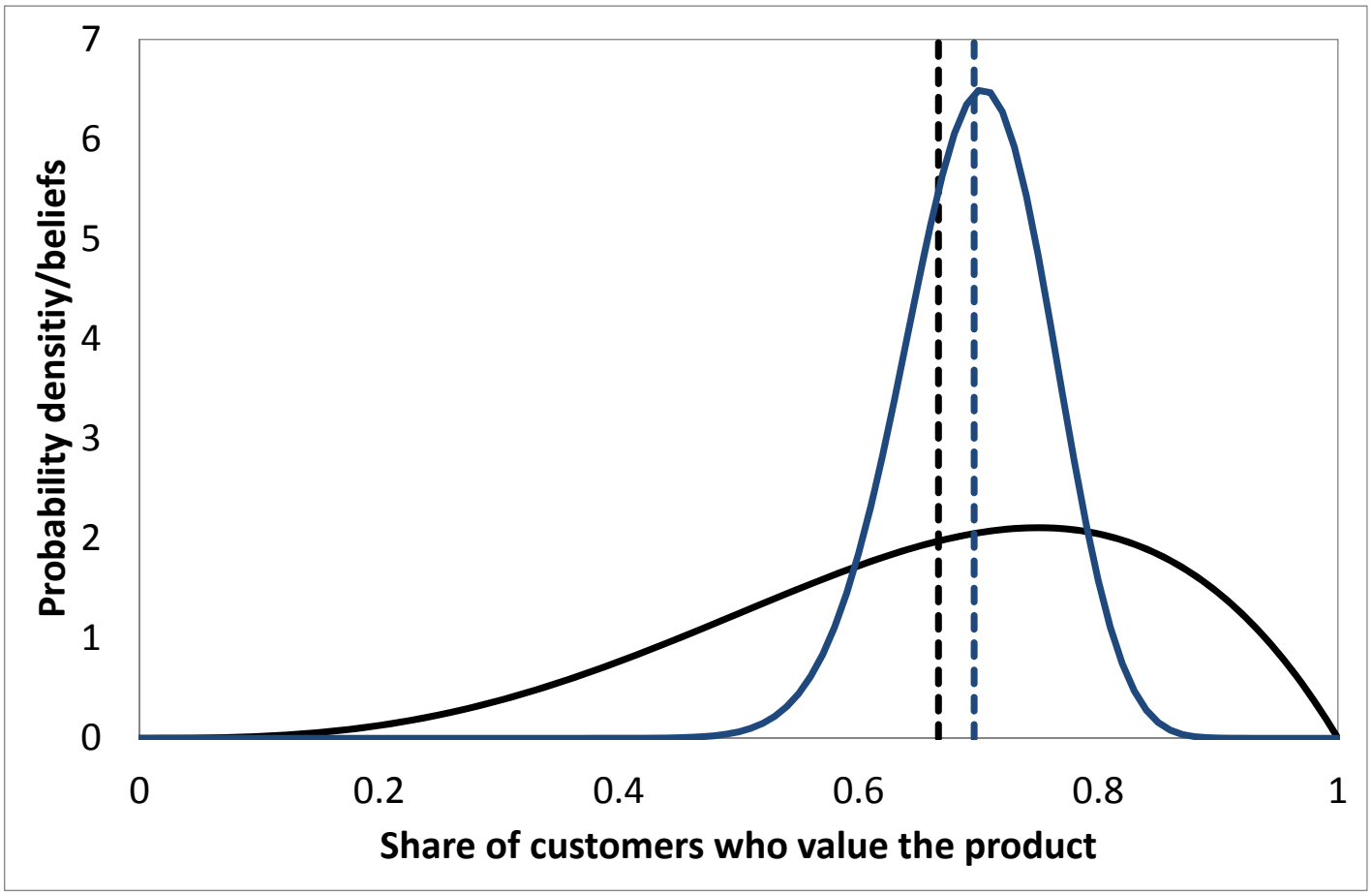
Benchmark

- $M \leq N$ consumers frictionlessly reveal their valuation at date 0.
- The firm has incentives to invest iff

$$-I + \delta m + \delta (N - M) \mathbb{E}[\theta | m] \geq 0,$$

  where m is the number of consumers with valuation 1 in sample M.
- Threshold: the firm invests if $m \geq \bar{m}$

Learning example with $Be(4,2)$: 35 out of 50 customers pre-order the product



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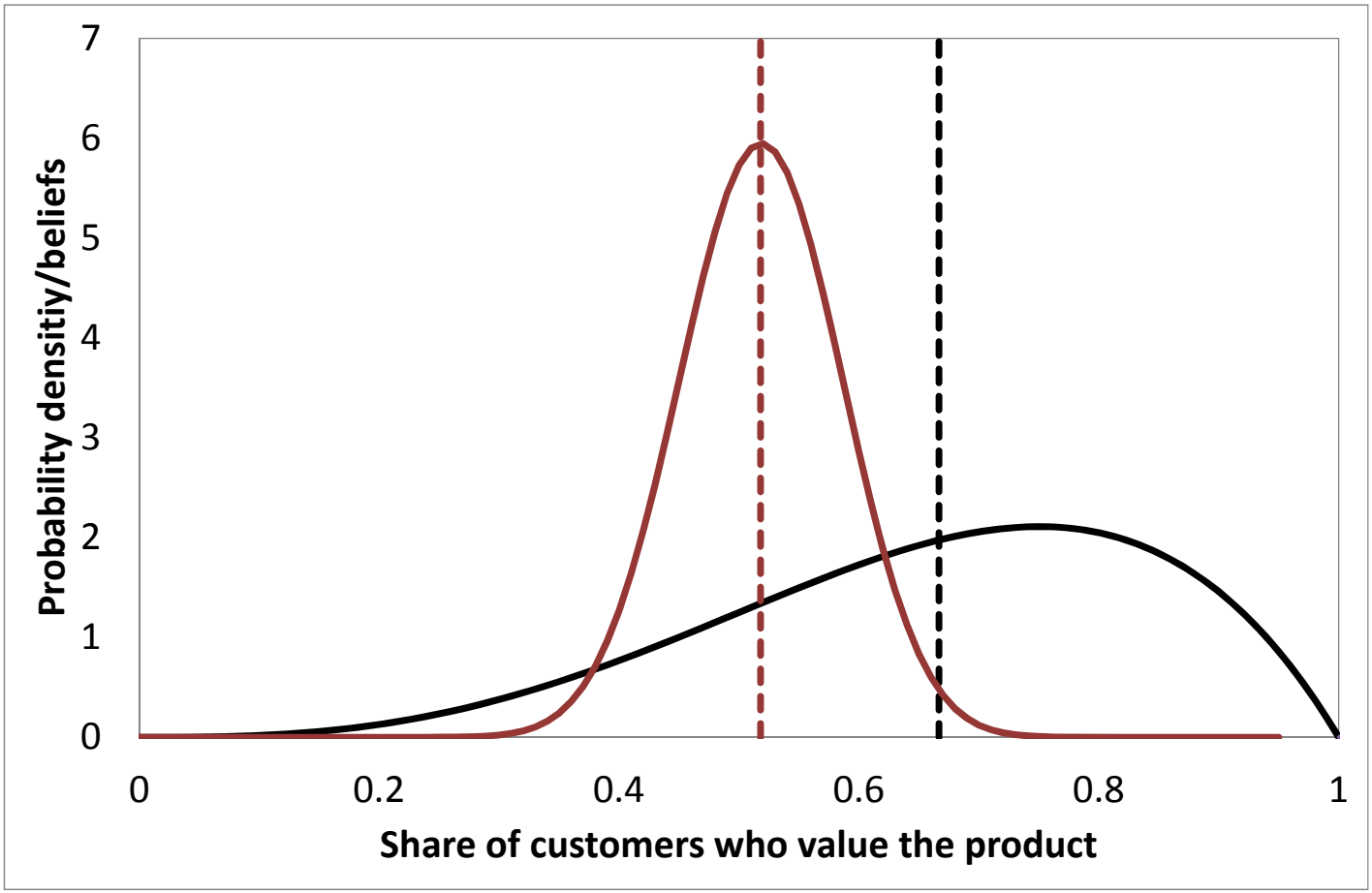


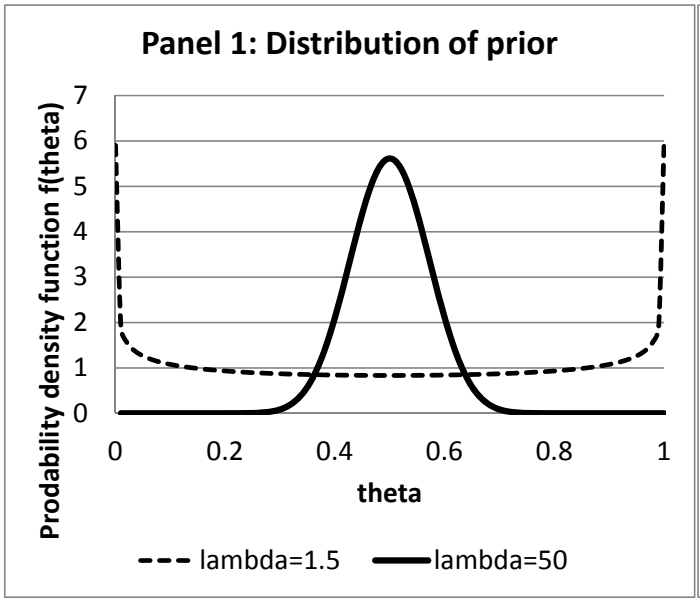
Insights from the benchmark model

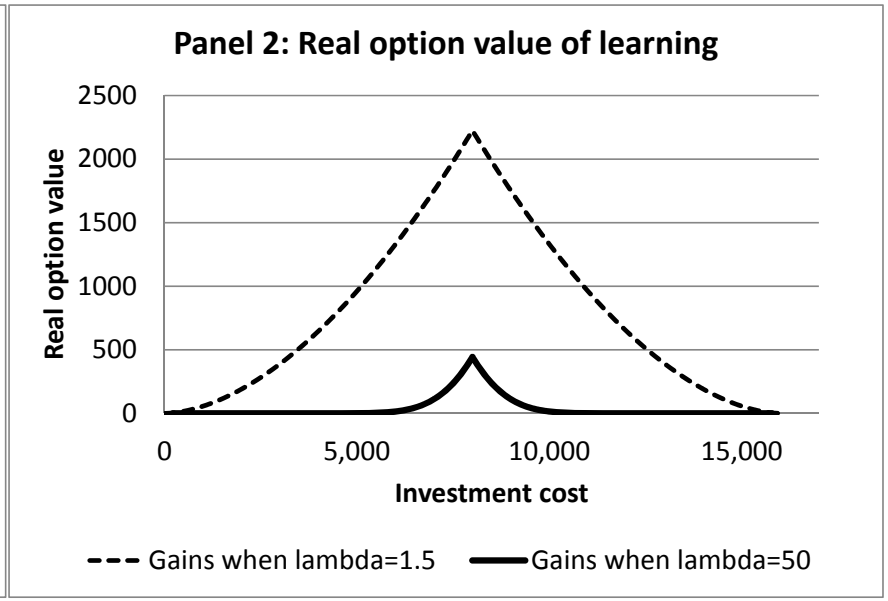
Low investment cost I. No gain from pre-selling.

Wide range of intermediate investment costs. Value of learning is positive and maximized at the ex-ante breakeven point.

Higher uncertainty about demand increases the value of learning.

Example on the value of learning





Crowdfunding

- Pre-selling is an efficient way to learn about preferences.
- But firms cannot commit to money back guarantees.
- Further, firms cannot either commit to limited campaign length and transparency.

Crowdfunding

- Third party platform indirectly mitigate moral hazard:
  - Transparency during the campaign.
  - Limited length of campaigns.

All-or-nothing crowdfunding - setting

- Timing during date 0:
  - **Morning of date 0:** the firm decides whether to launch a campaign.
  - **Mid-day of date 0:** the firm sets a target $\bar{m}'$ and pre-ordering price p_0.
  - **Afternoon of date 0:** M potential backers observe each other's decisions and decide whether to participate.
  - **Evening of date 0**: The firm gets $p_0 m$ iff $m \geq \bar{m}'$.
- We allow for reputation costs χ that may depend on whether the firm meets its target.
- Platforms are competitive and the intermediation cost is Z.

Decisions of the firm

- The firm always extracts all the high valuation consumer surplus.
- The firm invests iff

$$\delta m + \delta (N - M) E[\theta | m] - I \geq \delta m - \chi_Y \text{ if } m \geq \bar{m}'$$
$$\delta m + \delta (N - M) E[\theta | m] - I - \chi_N \geq 0 \text{ if } m < \bar{m}'$$

- Two thresholds: the lowest target the firm can commit to ($\bar{m}^{*\prime}$), and the investment threshold ($\bar{m}^{*}$).

All-or-Nothing - results

1. If reputation costs are small, the firm sets a target higher than optimal, and may want to invest after failure. Crowdfunding is possible as long as M is low enough.

2. If the reputation cost of no-delivery is intermediate and the cost of a failed campaign is high, the firm sets target higher than optimal and invests only if it meets the target.

3. If the reputation cost of no-delivery is high, the all-or-nothing scheme achieves the first best

- **As long as the reputation cost of failure is small, the firm's expected profit is nearly as high as the first best!**

Keep-it-all - results

- Both schemes can lead to the same outcome.
- In general, the firm profit is lower under keep-it-all, and cannot achieve the first best.
- With high reputation costs there is an additional inefficiency: despite low demand, the firm may have to invest in order to avoid the reputation cost of failure.

Empirical implications

- Successful projects are oversubscribed (especially when uncertainty is high).
- If moral hazard is severe, firms must set the target "too high":
  - Some firms continue after failure.
  - High target implies that completion ratio=pledges/target should be below 1 on average. Cumming et. al. (2015) finds an average completion ratio of 0.403<1 (based on Indioegogo data).

Empirical implications

- Shorter campaigns are associated with a higher success rate (see e.g., Mollick 2014).
- Platforms should (and do) take active steps to hide information about failed projects.
- Pre-orders are sold at par or at a discount.
- Complementarity with other sources of funding.
- Statistical structure to assess prior beliefs (e.g., effect of uncertainty).

Conclusion

- Crowdfunding is beneficial due to learning about demand, even without credit constraints.
- The value of crowdfunding comes from the option to avoid suboptimal investments. Firms with high uncertainty and intermediate investment costs gain most.
- Moral hazard is mitigated by third party platforms which can implement transparency, short campaigns (and reputation costs).
- "All-or-nothing" schemes dominate "keep-it-all" schemes.