Crowdfunding Public Projects with Provision Point: A Prediction Market Approach
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Motivation
Crowdfunding | Private Provisioning of Public Goods

Crowdfunding Process
1. Requester posts public project (non-excludable)
2. Agents arrive & observe:
   a) target amount (provision point),
   b) deadline
   c) pending amount.
3. Agents contribute (or not)
4. Requester executes project or refunds.

Mechanism Design Motivation
Agent’s true value for the project is private info. Strategic agents can freeride (No/Low contribution). Strategic agents can delay contribution. Project may not be funded even if everyone values it!

Related Work
1. [Bagnoli & Lipman ’89]: Provision Point Mechanism
   a) Simultaneous move game
   b) Project not funded at multiple equilibria.
2. [Zubrickas ’14]: PPM with Refund bonus
   a) Simultaneous move game
   b) Project funded at equilibrium.
3. [Our work]: PPM with Securities
   a) Sequential game
   b) Subgame perfect equilibrium: project funded.
4. [Hanson’03], [Chen & Pennock ’10]: Prediction Mkt
   a) Software agents: securities for prediction.
   b) Scoring Rule ≣ Cost Function.
   c) Specially suited for thin markets.

Mechanism Design
How to incentivize private citizens to contribute to public projects? The Freeriding problem.

Leverage infinite liquidity of LMSR to create a prediction market where each agent has an incentive to contribute.

Intuitive Explanation
1. Incentivizes agents to contribute by offering them a bonus greater than their contribution.
2. Bonus paid out iff the project is not funded.
3. Ensures that project is funded at equilibrium.

Novel Idea: Use prediction markets for bonus!

PPS Equilibrium
If
- Net value of the project > Cost of the project
- b ∈ (0, (θ - h0)/ln 2)
Then
- Project is funded at Equilibrium
- Equilibrium is subgame perfect (sequential game)
- Each agent contributes in proportion to his value
- Each agent contributes as soon as he arrives
- Agents have an incentive to contribute early.

PPS Equilibrium
Equilibrium is subgame perfect (Sequential Game)

Necessary conditions on Cost Function
1. Path Independence
2. Continuous & Differentiable
3. Information Incorporation
4. No Arbitrage
5. Sufficient Liquidity

References