Dive into QV

Chih-Cheng Liang

A starting point

Lalley, Steven and Weyl, Eric Glen, Quadratic Voting: How Mechanism Design Can Radicalize Democracy (December 24, 2017). American Economic Association Papers and Proceedings, Vol. 1, No. 1, 2018.

Intro to QV

- voice credits
- vote pricing rule
- price taking assumption: all voters agree on marginal pivotality of votes p
- QV is the unique robust optimal vote pricing rule

$$2pv_i u_i - c(v_i)$$

$$c(x) = x^a \text{ for } a > 1 \qquad 2pu_i = a(v_i)^{a-1} \implies$$

$$v_i = \text{sign}(u_i) \left(\frac{2p}{a}\right)^{\frac{1}{a-1}} |u_i|^{\frac{1}{a-1}}.$$

Practical Promise

- Game theoretic modeling
  - Lalley, Steven and Weyl, Eric Glen, Nash Equilibria for Quadratic Voting (July 16, 2019). Posted 2014
  - "welfare losses from QV decay at a rate 1/N as the population grows"
- Numerical Simulation
  - Chandar and Weyl (2017) Quadratic Voting in Finite Populations
  - "welfare lost from QV relative to the optimum is very small"
- Laboratory Experiments
  - Goeree and Zhang, 2017; Cardenas et al., 2014
  - Though not as game thoertic model predicted, outcome is closer to optimal than 1p1v

What has been tried?

- Optimal mechanism design
  - VCG: Vickrey, Clarke, and Groves (1973),
  - Sensitive to collusion
  - Depends on real money
- Fixes on optimal mechanism design
  - limited application
- Mechanism that does not pursuit optimality
  - some disallow expression of preference intensity
  - linear vote pricing rule: dictatorship of the most intense voters