The Role of Normative Analysis in Markets with Hidden Knowledge and Hidden Actions

Keith J. Crocker

Discussant: Andre Veiga

- Big honor and pleasure! ☺
- I will focus on risk-categorization

Roadmap

MWSE vs RSNE

- Competitive insurance markets
- Many H types: MWSE = RSNE
  - eql allocations depend only on the support of the type distribution
- Few H types:
  - RSNE does not exist
  - MWSE: both types better off than at the RSNE allocations

Hoy (1982)

- Risk classification can lead to a Pareto improvement

Example

- Before categorization, suppose eql is RSNE
- Risk categorization forms two categories
  - category 1: higher proportion of H types than the population. Same allocations, no change in welfare
  - category 2: smaller proportion of H types than the population. Suppose this implies the MWSE allocations $\rightarrow$ all individuals in this category are better off

- In general, there are winners and losers. Effects depend on equilibrium concept

Crocker and Snow (1985) and Crocker and Snow (1986)

Theorem

Every MWSE (and therefore, any RSNE when it exists) is informationally-constrained Pareto optimal.

Theorem

Utilities possibilities frontier with categorization lies partly outside and nowhere inside the frontier without categorization.

- Benefits from risk-classification can, in principle, be redistributed to induce a Pareto improvement

Roadmap

1. Recap
2. Other Recent Results
3. More Thoughts

Veiga (2022)

- Competitive market for lemons (1 contract)
- Nash equilibrium
- Risk-classification: prices can differ by at most δ across categories
  - industry breaks even across categories
  - Zero Price Discrimination (PD): $\delta = 0$
  - Full PD: $\delta = \Delta$
  - In general, $\delta \in [0, \Delta]$
  - This happens in the ACA exchanges

Veiga (2022)

- RESTRICTING risk-classification can INCREASE total surplus

Example

- Age-based pricing in health insurance
- Young are low-cost and homogeneous (no adverse selection)
- Old are high-cost and heterogeneous (adverse selection)
- Full PD ($\delta = \Delta$):
  - Young: $P = MC$
  - Old: high price (high average cost + adverse selection)
- Reducing δ (restricting PD) marginally...
  - Increases price to the young: since $P = MC$, the marginal welfare loss is zero
  - Lowers price to the old: mitigates adverse selection $\rightarrow$ increases welfare

Veiga (2022)

Theorem

Restricting PD increases total surplus when the high-cost market experience more severe adverse selection.

- This condition is empirically common (Hendren (2013))
- Optimal regulation is typically interior
- This regulation never delivers a Pareto improvement

Farinha Luz, Gottardi, and Moreira (2023)

- RS + continuum of 2D types (risk & risk aversion)
  - assumption: heterogeneity in risk aversion is small
- Equilibrium concept $\approx$ Dubey and Geanakoplos (2002) and Azevedo and Gottlieb (2017)
  - pooling (avoids RS independence of distribution)
- Risk classification = disclosure of a signal correlated with cost
- Welfare criterion: utility averaged over signal realizations
- Define "signal monotonicity" based on KL divergence
  - Rules out signals that separate agents with extreme risk from those with intermediate risk

Theorem

A signal is interim Pareto improving $\iff$ *it is monotonic.*

Lester et al. (2019)

- RS (2 risk types) + search costs (i.e., market power)
- Equilibrium concept: Nash
  - mixed strategies (avoids RS independence of distribution)
- Welfare metric: total surplus
- Risk classification = disclosure of a signal correlated with cost
  - poorly informative (e.g., if types are revealed, welfare clearly increases)
- Define a "summary statistic" of the severity of adverse selection

Theorem

Risk classification can INCREASE welfare if adverse selection AND trading frictions are severe.
It can REDUCE welfare if adverse selection is mild OR competition is strong.

- Results don't hold at PERFECT competition
  - some tension with Keith's results

Roadmap

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2. Other Recent Results
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Welfare criteria

- Are Pareto improvements too demanding?
  - Suppose that, initially, some types obtain full insurance
    - they cannot obtain any less in any Pareto improvement
    - yet, a marginal reduction in their coverage implies zero marginal utility loss
  - If a policy was a Pareto improvement, it likely would be implemented already?

- "Behind the veil of ignorance" individuals may be risk averse about which classification group they end up in
  - One could evaluate welfare ex-ante

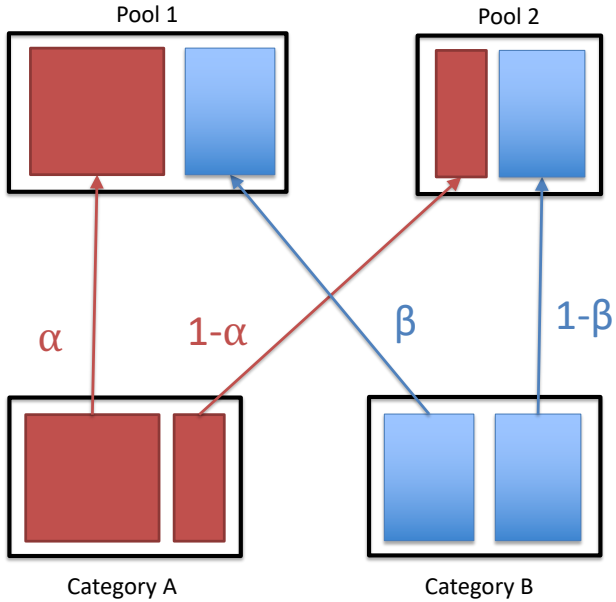
Continuous Regulation of Prices

- Many papers consider extreme forms of regulation
  - Use the signal or don't
  - Can we consider a more "continuous" space of policies?

Continuous Regulation of Prices

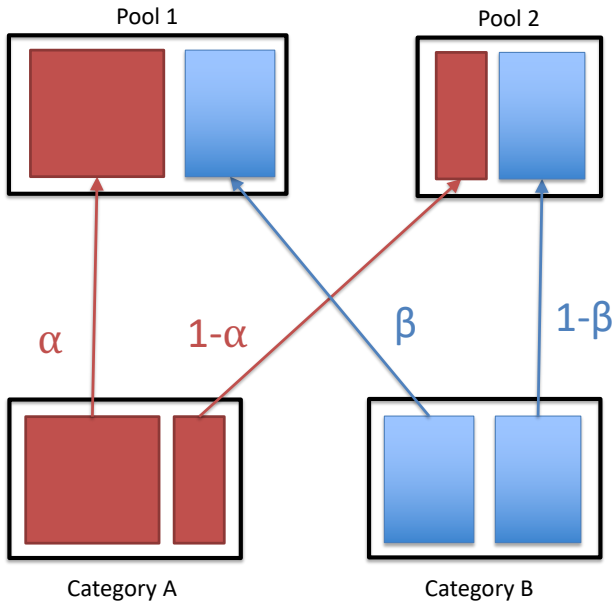
- Many papers consider extreme forms of regulation
  - Use the signal or don't
  - Can we consider a more "continuous" space of policies?
- Categories are $m \in \{A, B\}$
- In Veiga (2022), $\|p_A - p_B\| \leq \delta$
- Is there an analogue for menus?
  - Possible levels of coverage are x
  - Prices charged to category m are $P_m(x)$
  - "Difference" between the prices is the functional $D(P_A(\cdot), P_B(\cdot))$
  - Regulator mandates $D \leq \delta$
  - Industry maximizes profit (or breaks even) across both categories, subject to this constraint
  - What is a useful metric D? KL divergence?

Continuous Regulation of Information



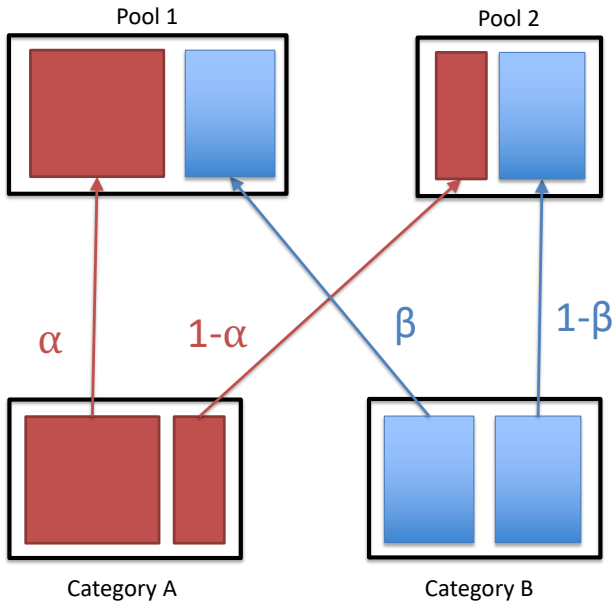
- Industry offers the same price/menu within each pool

Continuous Regulation of Information



- Industry offers the same price/menu within each pool
- $\alpha = \beta$: no information is revealed
  - composition of each pool is the same as overall population
- $\alpha = 1, \beta = 0$: all information is revealed
  - about categories, not types

Continuous Regulation of Information



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  - about categories, not types
- General α, β: regulator induces posterior beliefs by the industry about the composition of each pool
  - This is "Bayesian Persuasion" (Kamenica and Gentzkow (2011))

Which is best?

- Which form of regulation achieves the highest welfare?
- The two approaches coincide "at the extremes" but not "in the interior"
- Work in progress, with Daniel Quigley and Yanwei Sun

Thank you Keith and all!

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