Selection on Slopes

Amy Finkelstein

Fall 2025

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Selection on Levels vs. Slopes

- All you can eat restaurants
  - Selection on levels: people with big appetites
  - Selection on slopes: people who will eat a lot more when they don't have to pay on the margin

- Other names for related / same concept as selection on slopes:
  - "Essential heterogeneity" (Heckman et al 2006, 2011): Selection into treatment based on anticipated response to treatment
  - Roy selection / selection on gains
    - Choose over occupational options based on which one would produce your biggest boost in earnings

Why we might care (partial list)

- Trying to think about generalizing empirical estimates out of sample:
  - RAND Experiment: randomly assigned participants to health insurance plans with different amounts of consumer cost sharing
    - Extrapolating to impact of offering high deductible health insurance plans?
    - The randomization that solves the causal inference problem also removes the endogenous choice element
  - Oregon Experiment: randomized trial of impact of Medicaid coverage in which interested eligible individuals sign up for lottery.
    - Extrapolating to mandated Medicaid coverage under Obamacare?

- Implications for optimal design of government program (or private contract)
  - Will see several examples today
  - Note: as always, will need to think about goal of program: eg.
    - Redistribute
    - Correct market failures / change behavior (internalities/externalities)
    - Procure at lowest cost

Outline

- Selection on moral hazard: Einav et al. AER 2013
- Some applications / implications for targeting government policy:
  - Redistribution (Haushofer et al. AER 2025)
  - Correcting Market Failures (Aspelund and Russo 2024)
  - Procurement (Einav et al. QJE 2022)

Outline

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Selection on moral hazard (health insurance): model

- Model designed to isolate three distinct determinants of an individual's coverage choice: health risk, risk aversion, and "moral hazard type"
- An employee (in a given year) is characterized by
  - λ (monetized) health realization
  - $F_\lambda(\cdot)$ that govern health risk
  - ψ coefficient of absolute risk aversion
  - ω moral hazard type (price sensitivity)
- Two period model:
  - Period 1: given $(F_\lambda(\cdot), \omega, \psi)$, make optimal plan choice j^* from a plan menu J.
  - Period 2: given plan j, health realization λ, and ω, make optimal utilization (spending) choice $m^* \geq 0$.

Period 2 utility

- Individual's realized utility trades off health h and money y

$$u(m;\lambda,\omega) = h(m-\lambda;\omega) + y(m)$$

- Specifically, utility in period 2 given by:

$$u(m;\lambda,\omega,j) = \underbrace{\left[(m-\lambda) - \frac{1}{2\omega}(m-\lambda)^2\right]}_{h(m-\lambda;\omega)} + \underbrace{[y - c_j(m) - p_j]}_{y(m)}$$

  - Higher ω individuals have higher relative weight on health

- Convenient to define

$$\widetilde{u}(m;\lambda,\omega,j) = \left[(m-\lambda) - \frac{1}{2\omega}(m-\lambda)^2\right] - c_j(m)$$

Period 2 spending

- Optimal spending given by

$$m^*(\lambda, \omega, j) = \arg\max_{m \geq 0} \widetilde{u}(m; \lambda, \omega, j)$$

- With linear contracts ($c_j(m) = c_j m$):

$$m^*(\lambda, \omega, j) = \max[0, \lambda + \omega(1 - c)]$$

  - (Ignoring truncation) With no insurance ($c = 1$) spend λ. With full insurance ($c = 0$) spend $\lambda + \omega$.
  - Thus, ω ("moral hazard type") is (roughly) the utilization difference between full and no insurance
    - Spending responds more to changes in coverage for individuals of greater moral hazard type (higher ω)
- Useful to define $u^*(\lambda, \omega, j) = u(m^*(\lambda, \omega, j); \lambda, \omega, j)$

Period 1

- An individual valuation of plans has a CARA form over period 2's realized utility (which is monetized):

$$v_j(F_\lambda(\cdot), \omega, \psi) = -\exp(-\psi u^*(\lambda, \omega, j))dF_\lambda(\lambda)$$

  so optimal plan choice given by

$$j^*(F_\lambda(\cdot), \omega, \psi) = \arg\max_{j \in J} v_j(F_\lambda(\cdot), \omega, \psi).$$

- Optimal choice trades off higher up-front payment for more subsequent coverage
  - More coverage means both higher expected reimbursement and sheds off more risk
- Higher coverage more attractive for "higher" $F_\lambda(\cdot)$ (risk), higher ψ (risk aversion), and higher ω (moral hazard)

Econometric Model

- Observe: individual coverage choices and health care utilization
- Goal: jointly estimate coverage choices and utilization, relate estimated parameters of the model to underlying economic objects of interest, and quantify how welfare and spending are affected under various counterfactuals
- Individuals are defined by: $F_\lambda(\cdot)$, ω, and ψ
- Identification (more on this shortly)
  - From choices and utilization with no moral hazard can recover the distribution of health risk and risk aversion (recall Cohen and Einav 2007)
  - With exogenous variation in choice sets, have instrument that moves coverage choices so can identify moral hazard

Setting and Some Findings

- Employee choices from (menu) of health insurance contracts
  - Focus on choice between high vs. no deductible health insurance option
- Substantial heterogeneity in moral hazard
- Substantial selection on moral hazard
  - More behaviorally responsive individuals more likely to choose higher coverage option
  - For determining plan choice, selection on moral hazard roughly as important as "traditional" selection on health risk and considerably more important than selection on risk aversion
- Implications (example): Impact of introducing a high-deductible option for reducing health spending
  - Abstracting from selection on moral hazard could lead to substantial *over*-estimation of spending reduction associated with offering a high-deductible option

Sometimes you don't want random assignment

- Random assignment to plans solves causal inference problem (by design) by shutting down plan selection, which here we have shown can affect how we think about causal effects

Selection on moral hazard is a specific (economic) application of a more general (econometric) point

- Heterogeneity in treatment effects + selection into treatment based on anticipated treatment effects
- Heckman, Urzua and Vytlacil (2006) discuss properties of IV in this setting ("essential heterogeneity")
- Tracing out marginal treatment effects (MTEs) is useful / fun / interesting

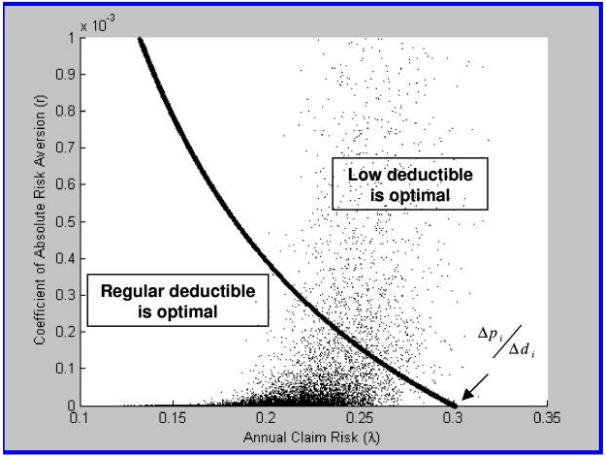
Identification of risk and preferences (no moral hazard)

- Loose intuition in two steps:
  - Claim data identify risk type
  - Insurance choice identifies preference heterogeneity (risk aversion)
- Distribution of ex-post claims allows us to update our priors about individual's risk type
  - All else equal, someone who (ex post) has more claims is more likely (from the econometrician's perspective) to be a higher (ex ante) claim type (random effect)
  - NB: Assumption of no moral hazard is key
- Conditional on (i.e. integrating over) distribution of risk types, contract choice pins down risk preferences

Identification with no moral hazard: Cohen and Einav (AER 2007)

- Setting: deductible choice in Israeli automobile insurance
  - Regular (~$350) vs. low (~$200) deductible
- Observe insurance choices and claims
- Three key assumptions allow them to use data on (ex post) realized claims to estimate distribution of (ex ante) claims rates
  - Claims are generated by a Poisson process at the individual level
  - Individuals have perfect information about the Poisson claim rate
  - No moral hazard
- Then use choice of deductible to estimate distribution of risk aversion and its correlation with claim rate
  - Conditional on your risk type your choice of deductible depends on your risk aversion

Identification of risk and preferences (assuming no moral hazard)



Source: Cohen and Einav (AER 2007) Estimating Risk Preferences from Deductible Choice

Identification (with moral hazard now)

- Given model, we seek to identify joint distribution of $F_\lambda(\cdot)$ (health expectations), ψ (coefficient of absolute risk aversion), and ω (moral hazard type)
- We observe data on individual health insurance options, choices, and medical spending
- Relative to earlier work (Cohen and Einav, 2007; Einav, Finkelstein and Schrimpf 2010), novel feature to identify is mh (and heterogeneity in it).
  - Key for identifying moral hazard: "exogenous" change in health insurance options

Identification: Ideal experiment

- (Endogenous) choice of two linear coverage (constant coinsurance) plans (high and low)
- Within each (endogeneously chosen plan): randomly assign a new (constant coinsurance) plan –> estimate behavioral response of those with each old plan
- Do those who chose higher coverage endogeneously have different estimated moral hazard effect?
- Advantages
  - Estimate treatment effects "cleanly" (via random assignment) and purged of selection
  - Linear coverage makes "treatment" easy to define
- Hold that thought....

Outline

- Selection on moral hazard: Einav et al. AER 2013
- Some applications / implications for targeting government policy:
  - **Redistribution (Haushofer et al. AER 2025)**
  - Correcting Market Failures (Aspelund and Russo 2024)
  - Procurement (Einav et al. QJE 2022)

Redistribution:Targeting on impact vs. deprivation

- Haushofer, Niehaus, Paramo, Miguel and Walker (AER 2025) "Targeting impact vs. deprivation"
- Key idea: even if consumption maps 1-1 to marginal utility of consumption, there is a tradeoff between targeting those with lowest consumption (most deprived) vs. targeting those most impacted by the program
  - If sufficiently large heterogeneity in treatment effects, may want to target on treatment effects, even if uncorrelated (or negatively correlated) with deprivation levels (consumption)
  - Therefore need to estimate joint distribution of marginal treatment effects (on e.g. consumption) and consumption to examine optimal targeting

Targeting on impact: applications

- Potential applications:
  - Job training
  - Subsidized credit
  - Triaging in the ER (most sick or most likely to benefit from rapid attention)

- Their application: large scale unconditional cash transfer in Kenya
  - Their finding: 'substantial trade-off between targeting for deprivation vs. impact': those predicted to be in the most deprived half of the sample if untreated have much smaller treatment effects than those in the most impacted half of the sample
  - Discuss

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Correcting market failures

- Externalities: environmental applications
  - e.g. payment for environmental services (to plant trees, to not crop etc)
- Key challenge: want to pay for marginal not inframarginal activity (were they going to not crop or plant trees anyway)
- Application: Paying for environmental services: Aspelund and Russo 2024: "Additionality and Asymmetric Information in Environmental Markets: Evidence from Conservation Auctions"
  - See also: Ito, Ida, and Tanaka 2023 AER "Selection on Welfare Gains: Experimental Evidence from Electricity Plan Choice"

Paying for Environmental Services

- Voluntary markets for environmental services (e.g. land management)
  - Externalities: changes in land use account for 13% of global greenhouse gas emissions, and lead to biodiversity loss, water pollution and erosion
  - Government payments / markets for environmental services aimed at reducing environmental degredation
- Key economic problem: Wedge between social value and private value of landowner participating in a PES contract:
  - Social value: depends on landowner private cost of complying and their 'additionality' (i.e. impact of contract on behavior or what land use would be in absence of participation)
  - Private value: depends on landowner private cost of complying and payment for participation
  - Lack of / lower additionality undermines social value of policy
- Setting: Conservation Reserve Program (CRP) administered by USDA
  - 10-year contracts to retire agricultural land and undertake conservation actions
  - Very large
  - Administered via a procurement auction with acreage constraints

Conceptual Framework

- Landowner i, contract $x_i \in \{0, 1\}$
  - $x_i = 1$ pays p for action $a_i = 1$ (conserving) vs. $a_i = 0$ (cropping)
  - $a_i = 1$ generates social benefits $B > 0$
- Landowner i defined by type $\theta_i = (c_i, a_{i0})$
  - c_i: private cost of contracting (foregone option value + hassle cost)
  - a_{i0}: action when $x_i = 0$ (NB: unobserved when $x_i = 1$)
- Assume perfect compliance (later document): i.e. $a_{i1} = 1$
- Define expected additionality (i.e. expected impact of contracting on a_i,i.e. treatment effect)

$$\tau(c) = \mathbb{E}[1 - a_{i0} \mid c = c_i]$$

Conceptual Framework

- Define expected additionality:

$$\tau(c) = \mathbb{E}[1 - a_{i0} \mid c = c_i]$$

- Expected social surplus of contracting:

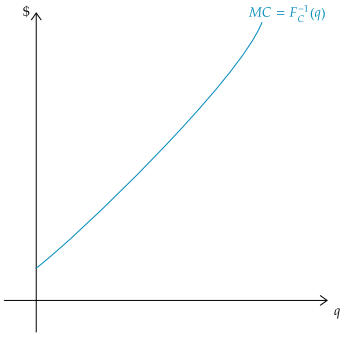
$$SS_i = B \cdot \underbrace{(1 - a_{i0})}_{\text{Additionality}} - c_i$$

- Landowner choice of whether to participate (ie.. choice $x_i = 1$) depends on price p:

$$x_i^*(p) = 1\{p - c_i \geq 0\}$$

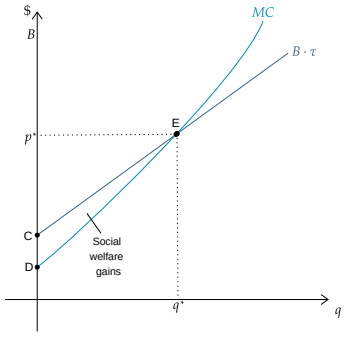
- Key wedge between social value (depends on c_i and $(1 - a_{i0})$) and private value (participation depends on c_i and p)

Graphical Framework



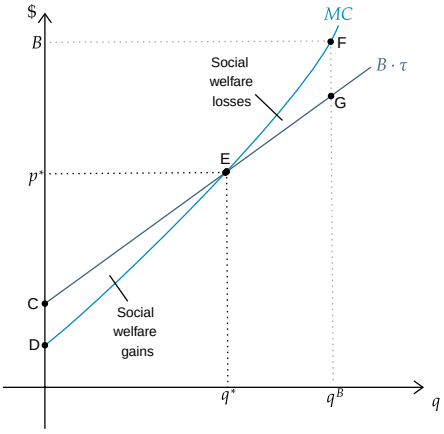
- x-axis: share of population ranked according to their contracting costs (c)
- MC curve is the inverse distribution function of contracting costs $F_C^{-1}(q)$

Graphical Framework

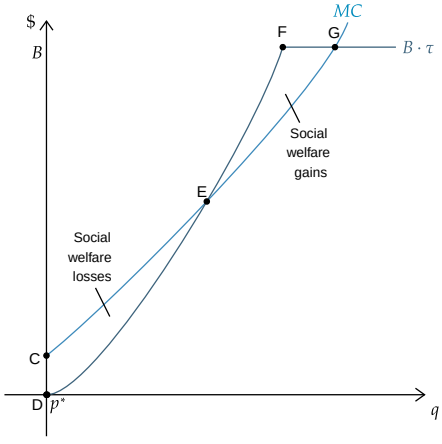


- $B{\cdot}\tau$: contract (social) value curve
  - drawn upward sloping (i.e. $\tau'(c) > 0$)
  - assumes expected additionality is increasing in conracting costs (i.e. adverse selection)
  - empirically could be anything (and will estimate)

Socially optimal incentives and market size



(a) Socially-optimal $(q^*, p^*) \neq (q^B, p^B)$



(b) Socially-optimal market size is zero

Key empirical objects

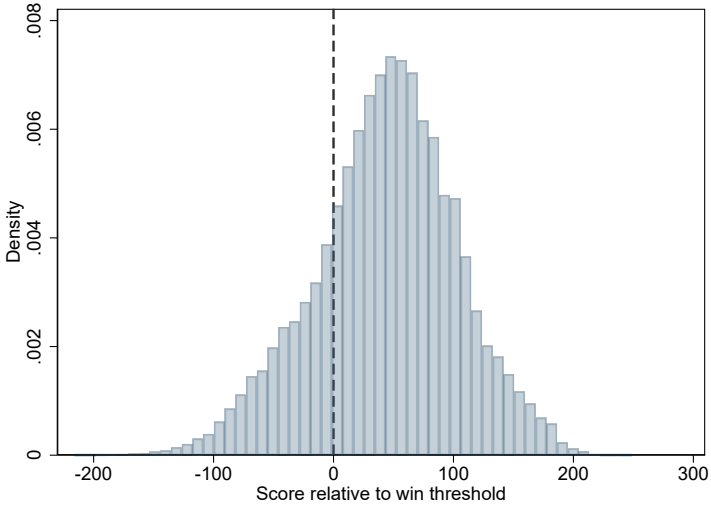
- Key empirical objects:
  - Shape of marginal cost curve, i.e. $f(c)$
  - Additionality (treatment effects) as a function of private costs, i.e. $\tau(c)$
- Key economic idea (will show up repeatedly in this lecture!):
  - selection on (welfare) gains (a.k.a Roy selection)
  - here (and in later applications): goal is to select on treatment effects (vs levels)
  - recall "selection on moral hazard" / all you can eat restaurants

Setting and data

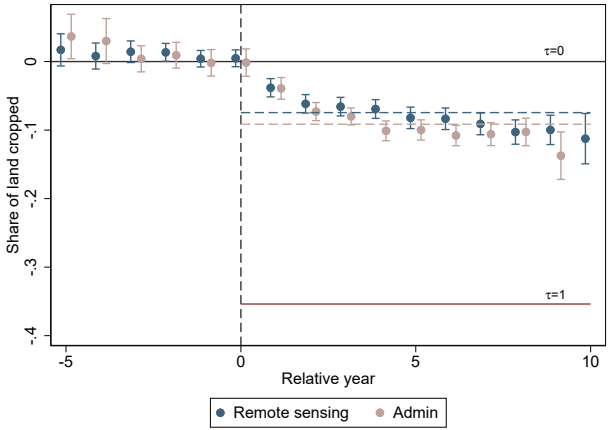
- Scoring auction
  - Higest score bidders awarded contract, paid bid
  - Scores increasing in environmental value of land (e.g. wildlife priority zone) and conservation actions (e.g. tree planting)
  - Congress determines aggregate acreage to be awarded contract (and hence threshold score for contract awards)

- Data:
  - Data on bids
  - Sattelite and admin data on land use (e.g. cropped or retired)

RD evidence: histogram of scores



RD evidence: 1 in 4 marginal bidders are additional

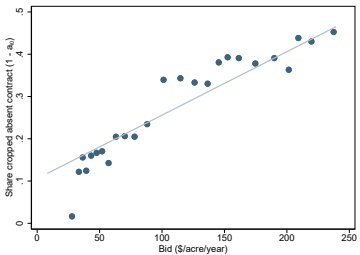


- NB: rejecting 0 and 1 points to important heterogeneity that motivates subsequent analyses / need to estimate $\tau(c)$ function

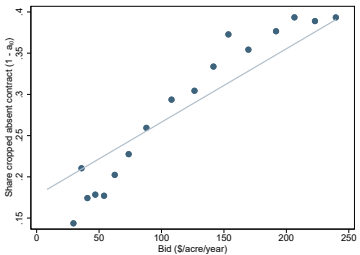
Evidence on adverse selection

Figure 5: Testing for Asymmetric Information

(a) Additionality vs. bids



(b) Additionality vs. bids | observables



- The 2016 auction only granted contracts to 18% of bidders
  - Therefore can observe correlation between b_i and 1-a_{i0} for 82% of landowners (conditoning on other bid components)
- NB: also show evidence of no spillovers and perfect compliance (which guides modeling)

Model of Bidding and Additionality

- Overview
  - Recover joint distribution of landowner costs and additionality
  - Together with B from the ltierature, use model to calculate social surplus from current and counterfactual policies

- Estimation in two steps:
  - Use optimality of bidding in the auction to estimate bidder's costs by revealed preference
  - Estimate expected additionality (as a function of those costs and landowner characteristics) to rationalize joint distribution of 1-a_{i0} and b using instruments that shift scoring rule (MSM)

Estimation in two steps

- Use optimality of bidding in the auction to estimate bidder's costs by revealed preference
  - Landowner chooses bid to maximize her expected payoff (payoff conditional on winning times probability of winning), given her costs

- Estimate expected additionality (as a function of those costs and landowner characteristics) to rationalize joint distribution of 1-a_{i0} and b using instruments that shift scoring rule (MSM)
  - Ideal experiment would grant no awards so could observe a_{i0} for every landowner
  - Use 3 instruments that shift payoffs. e.g.
    - Change in scoring rule (and observe same landowner bids under old and new rule!)
    - bidders in wildlife priority zones frace difference payoffs cross sectionally and over time

Estimates of Contracting Costs

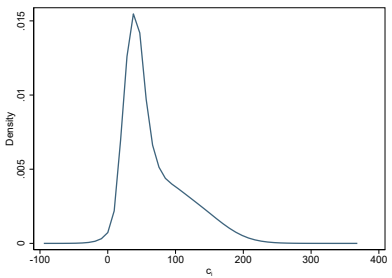


Figure 1: Distribution of c_i

	Mean
Base (c_i)	67.49
Top-up (κ_{ij})	
Intro. grasses	0.
Native grasses	0.11
Trees	24.41
Habitat	14.87
Rare habitat	15.33
Food plot	18.58
Pollinator	18.03

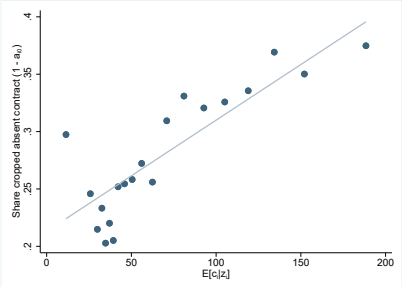
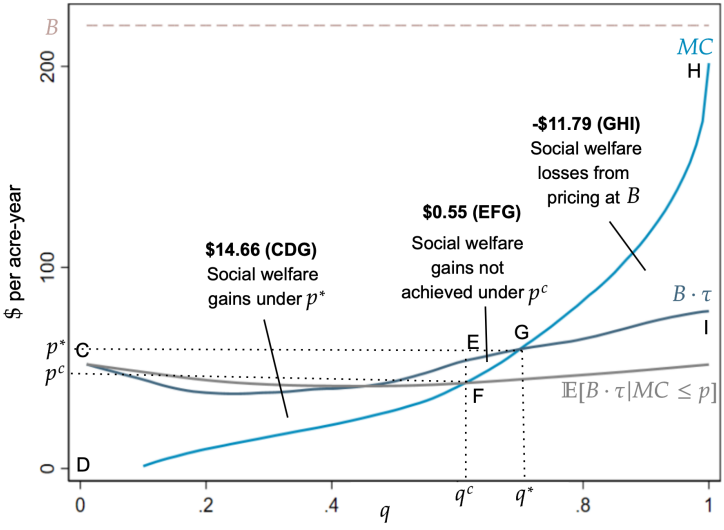


Figure 2: Estimates correlated with land use

Additionality as a Function of Landowner Costs

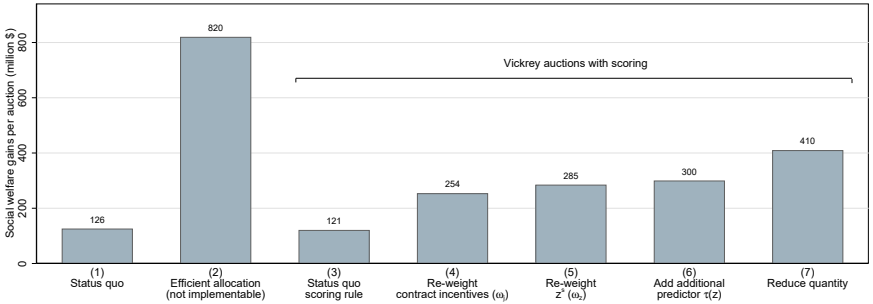
	$\tau(\mathbf{z}_i, c_i, \kappa_i)$							
	(1)		(2)		(3)		(4)	
β: base (c_i)	0.0018	(0.0002)	0.0020	(0.0002)	0.0007	(0.0003)	-0.0002	(0.0004)
α: top-up (κ_{ij})								
Trees					0.0035	(0.0002)	0.0046	(0.0005)
Native grasses							-0.0011	(0.0006)
Habitat							-0.0004	(0.0005)
Rare habitat							0.0027	(0.0007)
Food plot							0.0031	(0.0006)
Pollinator							0.0010	(0.0005)
z_i^S	✓		✓		✓		✓	
Soil prod + prev. land use			✓		✓		✓	

Social Welfare: Empirical Graphical Analysis



Social Welfare: Policy Counterfactuals

Figure 9: Social Welfare Under Alternative Auctions



Substantive findings re additionality in environmental markets

- **Testing:**
  - 3/4 of marginal CRP partiicpants are not additional
  - evidence of adverse selection
- **Quantifying:**
  - Joint model of bidding and land use
  - Identifying conservation and social welfare under observed, first best, and alternative policies

Meta comment re: exposition

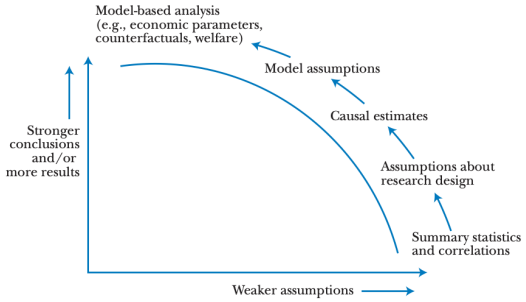
- Descriptive evidence
  - showing variation
  - using variation to provide preliminary evidence
- Use descriptive evidence to guide modeling choices
- Clearly articulare value added of the model
- Choose counterfactuals informed by variation

Mahoney (2022, JEP) Principles for Combining Descriptive and Model-Based Analysis

- Five guiding principles (which he illustrates with examples)
- 'Make the case' for your variation
  - Where does it come from?
  - Is it powerful?
  - Is it valid?
- Use descriptive analysis to provide preliminary or partial evidence (often: 'testing' but not quantifying)
- Use descriptive analysis to inform choices of what to model and what not to model (lots of pressure to expand / complicate model)
- Clearly articulate value-added of the model (while acknowledging tradeoffs)
- Choose parameters of interest and counterfactuals that are informed by your variation
  - This should not be an after thought / last minute decision (!)

Be on the Frontier

Figure 1
The Frontier Between Strength of the Assumptions and More Economically Relevant Results



- At each stage you are offering your reader a deal: accept more assumptions, and you'll get more results
- This structure allows reader to 'get off the train' at the point where they are no longer comfortable with the tradeoff being made

Outline

- Selection on moral hazard: Einav et al. AER 2013
- Some applications / implications for targeting government policy:
  - Redistribution (Haushofer et al. AER 2025)
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  - **Procurement (Einav et al. QJE 2022)**

Procurement

- Government procurement / incentive contracts
  - e.g. public health insurance (paying hospitals and providers)
  - e.g. construction, defense etc contracts
- Key challenge: want to induce socially efficient effort but also minimize government costs (Laffont and Tirole)
  - Price cap / Flat fee –> socially efficient effort but overpayment
  - Cost plus –> inefficient effort
- Application: Health care procurement: Einav, Finkelstein, Ji and Mahoney 2022: "Voluntary Regulation: Evidence from Medicare Payment Reform"

Voluntary Regulation

- Many government regulations / programs based on voluntary enrollment
  - Landholders provision of ecosystem services (Jack and Jayachandran 2019; Aspelund and Russo 2024)
  - Private schools participating in scholarship programs (DeAngelis et al. 2018)
  - Electricity consumers selecting into time-varying prices (Ida et al., 2023)
- Number of explanations
  - Political economy: too politically costly to make policy mandatory
  - Ideology: aversion to forcing mandatory compliance / preference for "nudges"
  - Economics: If those who enroll have private information about net benefits from changing behavior, can get favorable selection (selection on "slopes")
- Concern about unfavorable selection and "excess" public spending:
  - Voluntary programs attract those who benefit financially without much impact on behavior (selection on "levels")

Context

- Medicare / US health care
  - Providers traditionally paid on a Fee-for-Services (FFS; Cost Plus) basis
- Rapid growth of "alternative payment models" (e.g. Accountable Care Organizations)
- Active debate about whether programs should be mandatory or voluntary

Setting: Bundled Payment for Hip and Knee

- Pays admitting hospital a fixed amount ("target price") for entire episode of care
- Initially designed and implemented by government as a mandatory, 5-year, MSA-level randomized trial
  - Prior evidence from first two years that bundled payment reduced claims (modestly), driven by reduction in discharge to post-acute care (e.g. Finkelstein et al., 2018; Lewin Group 2018)
- End of second year, announced that from year 3, program is voluntary in half of the treated MSAs
  - Our initial frustration about the contamination / reduced time horizon for RCT was subsequently replacement by the excitement of the unique opportunity to study the merits of voluntary vs. mandatory programs!

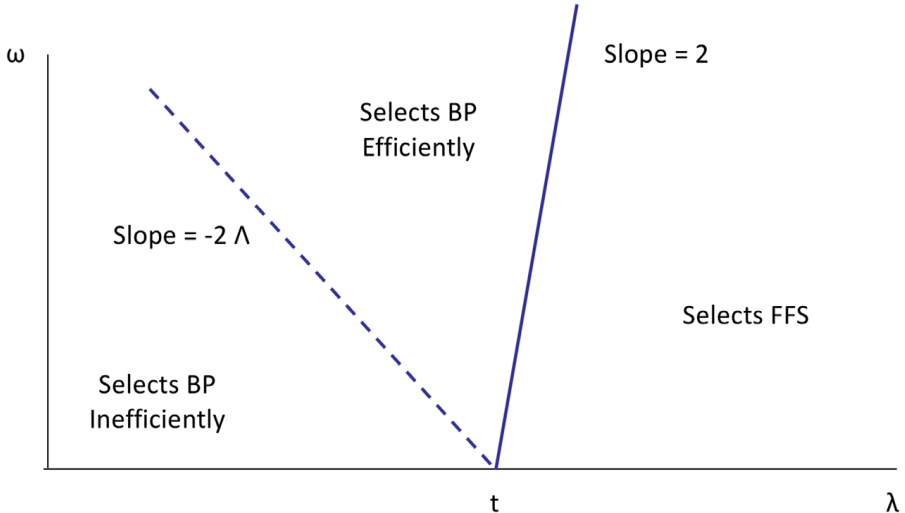
Descriptive evidence

- One quarter of hospitals (40% of episodes) select in to remaining in bundled payment
- **Selection on levels:** cheaper hospitals (with lower pre-program average episode claims) more likely to select in
- **Selection on slopes:** hospitals with larger treatment effects (greater reductions in claims during mandatory period) more likely to select in

Model of voluntary selection

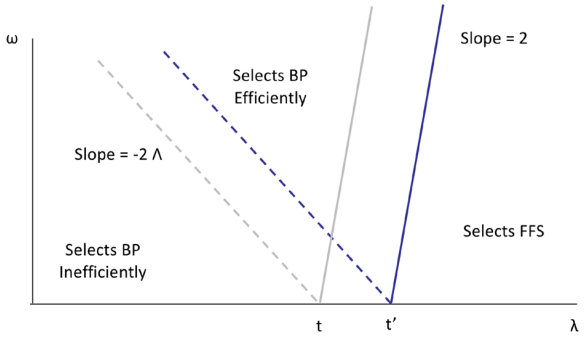
- Basic idea should be familiar from Aspelund and Russo (2024)
- Hospitals are characterized by a hospital-specific "level" (average claims per episode under FFS incentives) and a hospital-specific "slope" (reduction in claims under bundled payments)
- Costs and benefits of voluntary programs:
  - Benefit: hospitals select in based on private information about the net benefits / costs of changing behavior (a.k.a., selection on slope, selection on gains, Roy selection)
  - Cost: hospitals select in based on private information on how much government transfer they can receive without changing behavior ("selection on levels")
- Bundled payment induces hospitals to incur first best level of effort (residual claimant) but at potential cost of overpayment (cost of public funds)

Social Welfare: Graphical



Social Welfare: Graphical

- Larger t will increase hospitals in BP, overall and inefficiently
- Larger slopes ($\omega \gg 0$) will result in more hospitals selecting BP efficiently
- Accurate target prices ($t \approx \lambda$) will result in less inefficient selection in
- Smaller slopes ($\omega \approx 0$) and lots of heterogeneity in ($t - \lambda$) will lead to lots of inefficient selection in



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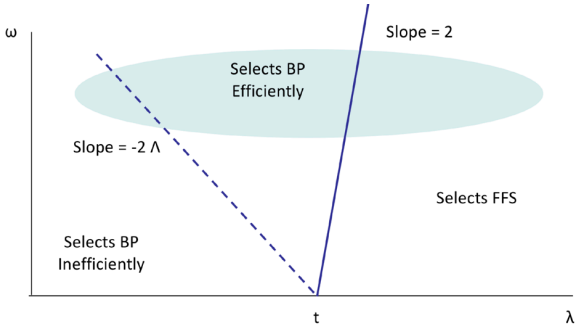

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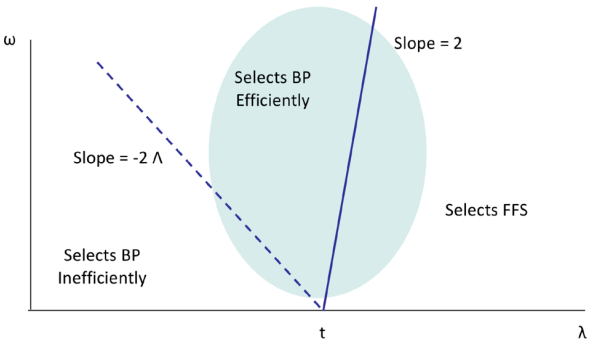

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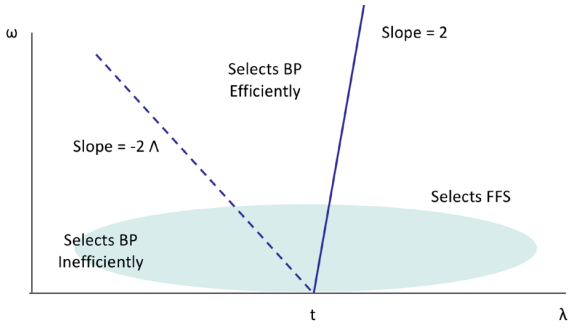
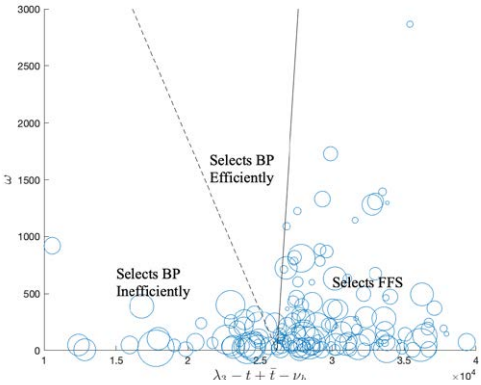


Estimation: identification intuition

- Observe hospital-specific (pre-period) levels
- Random assignment (mandatory participation) identifies slopes (both for those who will select in and those who won't!)
- Voluntary decision in year 3 identifies selection

Social Welfare: Empirical



- Voluntary bundled payments modestly raise social surplus relative to FFS status quo

Counterfactuals: More or less targeting

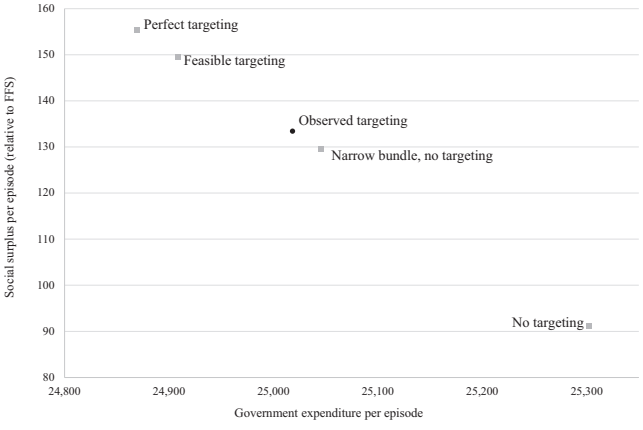


FIGURE V

Key findings

- Descriptive:
  - Voluntary participation more likely for hospitals that can increase revenue without changing behavior (selection on levels) and that had large changes in behavior when selection was mandatory (selection on slopes)
- Model based:
  - Current voluntary regime generates inefficient transfers to hospitals, and alternative (feasible) designs could reduce these inefficient transfers and raise welfare

Meta comment on paper construction

- (Hopefully) follows the Mahoney 2022 typology
- Making lemonade out of lemons I: RCT aborted
- Making lemonade out of lemons II: Choosing which results to emphasize
  - Don't emphasize comparison to mandatory because sensitive to whether a choice shifter (needed to rationalize hospital choices) is welfare relevant or not
  - Bottom line welfare consequences of voluntary regime are not large, so instead emphasize ability to improve with alternative feasible design
    - Note: welfare consequence of voluntary regime flipped sign between working paper and revision (!)
    - But paper didn't have to change because we had not emphasized the (small) negative finding

Comment: Selection on Welfare Gains

- Both the payment for environment services and Medicare payment structure applications have the same fundamental economic properties:
  - voluntary participation
  - wedge between private benefit from contract and social benefit from contract
- This is a more general property of many economic problems:
  - Take-up of social programs
  - worker training programs
  - See Ida, Ito, and Tanaka 2023 "Selection on Welfare Gains: Experimental Evidence from Electricity Plan Choice"

Outline

- Selection on moral hazard: Einav et al. AER 2013
- Some applications / implications for targeting government policy:
  - Redistribution (Haushofer et al. 2022)
  - Correcting Market Failures (Aspelund and Russo 2024)
  - Procurement (Einav et al. QJE 2022)
- **Bonus Material: What are our design instruments?**
  - Targeting on unobservables (self-selection / screening / self-targeting) or observables?

Design Instruments

- Ida et al. (2023): "Choosing Who Chooses: Selection-Driven Targeting in Energy Rebate Programs"
- Key question: optimal policy design when can target by observables and through self-selection
  - Targeting on observables (a.k.a. fun with causal forests): Kitagawa and Tetenov 2018; Athey and Wager 2021
  - Targeting through self-selection (remember Nichols-Zeckhauser, Alatas et al, selection on slopes etc)
- Unclear which is 'better'

Choosing who chooses: Framework

- Social welfare gains from treatment are heterogeneous across individuals
- Policymaker can leverage both observables and unobservable information by indentifying three types of individuals based on observables:
  - Those who should not be treated
  - Those who should be (mandatorily) treated
  - Those who should choose by themselves whether to receive the treatment
- Key empirical objects (all conditional on observables):
  - ATE
  - LATE for takers and LATE for non-takers (when given a choice)

Choosing who chooses: Application

- Residential electricity rebate program in Japan
  - Program goal: incentivize energy conservation during peak demand hours (high marginal cost)
  - Social welfare gains from rebate program can be positive, negative or zero across individuals given per-household implementation costs
- RCT with three arms: untreated, treated, and self-selection

Concluding thoughts

- Lots of interesting targeting work (conceptual; applications) still to be done
- Important to think about:
  - Objective of program (redistribution? market failure correction? procurement?)
  - Set of instruments under consideration
- Showcasing my favorite paper structure (a la Mahoney 2022)