Econ 219B
Psychology and Economics: Applications (Lecture 12)

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Outline

1. Market Reaction to Biases: Introduction
2. Behavioral IO: Behavioral Consumers
3. Behavioral IO: Behavioral Firms
4. Methodology: Markets and Non-Standard Behavior
5. Behavioral Political Economy

Section 1

Market Reaction to Biases: Introduction

Who is Behavioral?

- So far, we focused on consumer deviations from standard model
- Who exhibits each of these deviations?

1. **Self-control and naivete'.** Consumers (health clubs, food, credit cards, smoking), Employees (retirement saving, benefit take-up), Students (homework)
2. **Reference dependence.** Workers (labor supply, increasing wages), (inexperienced) traders (sport cards), Investors, Consumers (insurance), House owners
3. **Social preferences.** Consumers (giving to charities), Employees (effort, strikes)

Who is Behavioral?

4. **Biased Beliefs.** Individual investors, CEOs, Consumers (purchases, betting)
5. **Inattention.** Individual investors, Consumers (eBay bidding, taxation)
6. **Menu Effects.** Individual investors, Voter, Consumers (loans, 410(k) plans)
7. **Social Pressure and Persuasion.** Voters, Employees (productivity), Individual investors (and analysts)
8. **Emotions.** Individual investors, Consumers

- What is missing from the picture?

Missing Elements

- Actors
  - Experienced agents
  - Firms
  - Broadly speaking, market interactions with 'rational' agents
- Market interactions
  - Everyone 'born' with biases
  - But: Effect of biases lower if:
    - learning with plenty of feedback
    - advice, access to consulting
    - specialization
    - Competition 'drives out of market' (BUT: See last lecture)
- For experienced agents these conditions are more likely to be satisfied

Biases in the Market

- Implications? Study biases in the market
- Six major instances:
  1. Interaction between firms and consumers (contract design, price choice)
  2. Interaction between experienced and inexperienced investors (noise traders and behavioral finance)
  3. Interaction between managers and investors (corporate finance)
  4. Interaction between employers and employees (labor economics)
  5. Interaction between politicians and voters (political economy)
  6. Institutional design

Section 2

Behavioral IO: Behavioral Consumers

Behavioral IO: Consumers

- Start from case of
  - Consumers purchasing products have biases
  - Firms, unbiased, maximize profits
- **DellaVigna and Malmendier (QJE 2004).**
  - Consumers with $\left(\beta, \hat{\beta}, \delta\right)$ preferences
  - Monopoly, 2-part tariff: L (lump-sum fee), p (per-unit price)
  - Cost: set-up cost K, per-unit cost a

Consumption of investment good

- (Non-monetary) cost c at $t = 1$, distribution $F(c)$
- Benefit $b > 0$ at $t = 2$, deterministic

Firm Behavior

Profit-maximization:

$$\max_{L,p} \delta \left\{ L - K + F\left(\beta\delta b - p\right)\left(p - a\right) \right\}$$

$$\text{s.t. } \beta\delta \left\{ -L + \int_{-\infty}^{\hat{\beta}\delta b - p} \left(\delta b - p - c\right) dF\left(c\right) \right\} \geq \beta\delta\bar{u}$$

- Notice the difference between β and $\hat{\beta}$
- Substitute for L to maximize

$$\max_{L,p} \delta \left\{ \int_{-\infty}^{\hat{\beta}\delta b - p} \left(\delta b - p - c\right) dF\left(c\right) + F\left(\beta\delta b - p\right)\left(p - a\right) - K - \beta\delta\bar{u} \right\}$$

Features of the equilibrium

$$
\begin{aligned}
p^* \quad = \quad & a && \text{[exponentials]} \\
& - \left(1 - \hat{\beta}\right) \delta b \frac{f\left(\hat{\beta}\delta b - p^*\right)}{f\left(\beta\delta b - p^*\right)} && \text{[sophisticates]} \\
& - \frac{F\left(\hat{\beta}\delta b - p^*\right) - F\left(\beta\delta b - p^*\right)}{f\left(\beta\delta b - p^*\right)} && \text{[naives]}
\end{aligned}
$$

1. *Exponential agents* ($\beta = \hat{\beta} = 1$).
   Align incentives of consumers with cost of firm
   $\Longrightarrow$ marginal cost pricing: $p^* = a$.
2. *Hyperbolic agents.* Time inconsistency
   $\Longrightarrow$ below-marginal cost pricing: $p^* < a$.
   1. *Sophisticates* ($\beta = \hat{\beta} < 1$): commitment.
   2. *Naives* ($\beta < \hat{\beta} = 1$): overestimation of consumption.

Market (II): Leisure Goods

Payoffs of consumption at $t = 1$:

- Benefit at $t = 1$, stochastic
- Cost at $t = 2$, deterministic

$\Longrightarrow$ Use the previous setting: $-c$ is "current benefit", $b < 0$ is "future cost."

Results:

1. *Exponential agents.*
   Marginal cost pricing: $p^* = a$, $L^* = K$ (PC).
2. *Hyperbolic agents* tend to overconsume. $\Longrightarrow$
   Above-marginal cost pricing: $p^* > a$. Initial bonus $L^* < K$ (PC).

Extensions

- *Perfect Competition.* Can write maximization problem as

$$\max_{L,p} -L + \int_{-\infty}^{\hat{\beta}\delta b - p} (\delta b - p - c)\, dF(c)$$
$$\text{s.t. } \delta \left\{ L - K + F(\beta\delta b - p)(p - a) \right\} = 0$$

  - Implies the same solution for p^*.

- *Heterogeneity.* Simple case of heterogeneity:
  - Share μ of fully naive consumers, share $1-\mu$ of exponential consumers
  - At $t = 0$ these consumers pool on same contract, given no immediate payoffs

$$\begin{aligned} p^* &= a \\ &\quad -\mu \frac{F(\delta b - p) - F(\beta\delta b - p)}{\mu f(\beta\delta b - p) + (1-\mu) f(\delta b - p)} \end{aligned}$$

Empirical Predictions

Two predictions for time-inconsistent consumers:

1. Investment goods (Proposition 1):
   1. Below-marginal cost pricing, Initial fee (Perfect Competition)
   - US Health club industry, monthly and annual contracts
   - Vacation time-sharing industry, high initial fee, minimal fee per week of holiday
2. Leisure goods (Corollary 1)
   1. Above-marginal cost pricing, Initial bonus or low initial fee (Perfect Competition)
   - Credit card industry, No initial fee, bonus, above-marginal-cost pricing of borrowing
   - Gambling industry: Las Vegas, Price rooms and meals below cost, at bonus, High price on gambling

Welfare Effects 1

Result 1. Self-control problems + Sophistication $\Rightarrow$ First best

- Consumption if $c \leq \beta\delta b - p^*$
- Exponential agent:
  - $p^* = a$
  - consume if $c \leq \delta b - p^* = \delta b - a$
- Sophisticated time-inconsistent agent:
  - $p^* = a - (1-\beta)\delta b$
  - consume if $c \leq \beta\delta b - p^* = \delta b - a$
- Perfect commitment device

- Market interaction maximizes joint surplus of consumer and firm

Welfare Effects 2

Result 2. Self-control + Partial naiveté $\Rightarrow$ Real effect of time inconsistency

- $p^* = a - [F(\delta b - p^*) - F(\beta\delta b - p^*)]/f(\beta\delta b - p^*)$
- Firm sets p^* so as to accentuate overconfidence
- Two welfare effects:
  - Inefficiency: Surplus $_{\text{naive}} \leq$ Surplus $_{\text{soph.}}$
  - Transfer (under monopoly) from consumer to firm
- Profits are increasing in naiveté $\hat{\beta}$ (monopoly)
- Welfare $_{\text{naive}} \leq$ Welfare $_{\text{soph.}}$
- Large welfare effects of non-rational expectations

Contracting

- **Eliaz and Spiegler (RES 2006),** Contracting with Diversely Naive Agents.

1. Actions:
   - Action $a \in [0, 1]$ taken at time 2
   - At time 1 utility function is $u(a)$
   - At time 2 utility function is $v(a)$
2. Beliefs: At time 1 believe:
   - Utility is $u(a)$ with probability θ
   - Utility is $v(a)$ with probability $1 - \theta$
   - Heterogeneity: Distribution of types θ
3. Transfers:
   - Consumer pays firm $t(a)$

Compare Setup

- Compare to DellaVigna and Malmendier (2004)
  - Time inconsistency ($\beta < 1$) $\rightarrow$ Difference between u and v
  - Naiveté ($\hat{\beta} > \beta$) $\rightarrow \theta > 0$
  - Partial naiveté here modeled as stochastic rather than deterministic
  - Flexibility in capturing time inconsistency (self-control, reference dependence, emotions)
  - Full screening problem, with generic contract space

Main result

- **Proposition 1.** There are two types of contracts:
  1. Perfect commitment device for sufficiently sophisticated agents ($\theta < \underline{\theta}$)
     - Implement $a_\theta = \max_a u(a)$
     - Transfer:
       - $t(a_\theta) = \max_a u(a)$
       - $t(a) = \infty$ for other actions
  1. Exploitative contracts for sufficiently naive agents ($\theta > \underline{\theta}$):
     - Agent has negative utility:

$$u(a_\theta^v) - t(a_\theta^v) < 0$$

     - Maximize overestimation of agents:

$$a_\theta^u = \arg\max\left(u(a) - v(a)\right)$$

Bounded Rationality

- **Gabaix and Laibson (2003)**, *Competition and Consumer Confusion*

- Non-standard feature of consumers:
  - Limited ability to deal with complex products
  - imperfect knowledge of utility from consuming complex goods

Example: Checking account. Value depends on

- interest rates
- fees for dozens of financial services (overdrafts, more than x checks per months, low average balance, etc.)
- bank locations...

Model

- Consumers receive noisy, *unbiased* signals about product value.
  - Agent a chooses from n goods.
  - True utility from good i:

$$Q_i - p_i$$

  - Utility signal

$$U_{ia} = Q_i - p_i + \sigma_i \varepsilon_{ia}$$

    σ_i is complexity of product i.
    ε_{ia} is zero mean, iid across consumers and goods, with density f and cumulative distribution F.
- Consumer decision rule: Picks the one good with highest signal U_i from $(U_i)_{i=1}^n$
- Firms maximize profit $\pi_i = (p_i - c_i) D_i$

Example of Demand Curves

Simplification: Q_i, σ_i, c_i identical across firms
Gaussian noise $\varepsilon \sim N(0,1)$, 2 firms
Demand curve faced by firm 1:

$$\begin{aligned} D_1 &= P\left(Q - p_1 + \sigma\varepsilon_1 > Q - p_2 + \sigma\varepsilon_2\right) \\ &= P\left(p_2 - p_1 > \sigma\sqrt{2}\eta\right) \text{ with } \eta = \left(\varepsilon_2 - \varepsilon_1\right)/\sqrt{2}\ \mathrm{N}(0,1) \\ &= \Phi\left(\frac{p_2 - p_1}{\sigma\sqrt{2}}\right) \end{aligned}$$

Usual Bertrand case $(\sigma = 0)$: infinitely elastic demand at $p_1 = p_2$

$$D_1 \in \left\{ \begin{array}{ccc} 1 & \text{if} & p_1 < p_2 \\ [0,1] & \text{if} & p_1 = p_2 \\ 0 & \text{if} & p_1 > p_2 \end{array} \right\}$$

Complexity case ($\sigma > 0$) : Smooth demand curve, no infinite drop at $p_1 = p_2$. At $p_1 = p_2 = p$ demand is $1/2$.

$$\max_{p_1} \Phi\left(\frac{p_2 - p_1}{\sigma\sqrt{2}}\right)[p_1 - c_1]$$

$$f.o.c. : -\frac{1}{\sigma\sqrt{2}}\phi\left(\frac{p_2 - p_1}{\sigma\sqrt{2}}\right)[p_1 - c_1] + \Phi\left(\frac{p_2 - p_1}{\sigma\sqrt{2}}\right) = 0$$

Intuition for non-zero mark-ups: Lower elasticity increases firm mark-ups and profits. Mark-up proportional to complexity σ.

Endogenous complexity

- Consider Normal case $\rightarrow$ For $\sigma \rightarrow \infty$

$$\max_{p_1} \Phi\left(\frac{p_2 - p_1}{\sigma\sqrt{2}}\right)[p_1 - c_1] \rightarrow \max_{p_1} \frac{1}{2}[p_1 - c_1]$$

Set $\sigma \rightarrow \infty$ and obtain infinite profits by letting $p_1 \rightarrow \infty$ (Choices are random, Charge as much as possible)

- Gabaix and Laibson: Concave returns of complexity $Q_i(\sigma_i)$ Firms increase complexity, unless "clearly superior" products in model with heterogenous products.

In a nutshell: market does not help to overcome bounded rationality. Competition may not help either

More work on Behavioral IO

- See summary in **Heidhues-Koszegi (Handbook, 2018)** and in **Koszegi (JEL 2014)**
- Different applications
  - Self-control and naivete' (**DellaVigna-Malmendier, QJE 2004; Eliaz and Shafir, RES 2006; Heidhues and Koszegi, AER 2010**)
  - Limited attention and shrouded attributes (**Gabaix and Laibson, QJE 2006**)
    - Firms charge higher prices on shrouded attributes (add-ons)
  - Reference dependence and pricing (**Heidhues and Koszegi, AER 2008**)
    - Can explain structure of sales with Koszegi-Rabin reference points
  - Deception (**Heidhues, Koszegi, and Murooka, RES 2017**)

- Some common themes:
  - When consumers are sophisticated,
    - firms will generally provide welfare-enhancing products, like commitment devices, memory tools, etc
    - welfare consequences will be positive
  - When consumers are naive, instead,
    - firms will take advantage of wrong beliefs,
    - Consumer welfare often below the reservation utility
  - Competition vs. monopoly
    - Exploitation of biases does not per se depend on market structure
    - Competition however redistributes back to consumers part of the rents from exploitation
  - Cross-subsidization across types: naives subsidize rational types

Section 3

Behavioral IO: Behavioral Firms

Are firms behavioral?

- Reasonable to assume that firms respond to consumers self-control, naivete' reference dependence
- But are firms behavioral in maximizing profits?
- 'Behavioral firms' is likely key area of future research
  - Firms may be very good at maximizing within a particular dimension
  - Yet, they may miss another dimension altogether

First examples from sports

- **Romer (JPE 2006)**
  - Examine specific decision of a sports team – a firm – choice on fourth down in NFL
  - Can measure all the relevant variables and solve via dynamic programming
  - Shows that teams forego profit opportunity
  - **Massey and Thaler (MS 2017)**
    - Examines pricing of players in NFL
    - Shows that firms follow a specific pricing from a textbook
    - Yet, can pick better players by deviating

Levitt (2006): Bagelman story

- Retired economist delivers bagels to offices in NYC
- Bagelman has to set two variables:
  - Quantity delivered to each office: do not want excess bagels (stale), nor too few (lost profits)
  - Price of bagels
- Quantity: bagelman is perfect on average
- Price: bagelman is way off, sets too low price. Price increased twice, both times profits are up

- Is it lack of experimentation?

Hanna, Mullainathan, Schwartzstein (QJE 2014)

- Examines seaweed farmers in Indonesia
- What do they pay attention to?
- Researchers do experiments varying
  - Pod size
  - Pod spacing
- Farmers pay a lot of attention to pod spacing
- Experiments $\rightarrow$ Farmers get about optimal choice in pod spacing
- Farmers were not instead paying attention to pod size
- Experiments $\rightarrow$ Farmers far from optimum on pod size
- When given feedback farmers change the pod size

Results

Table 5: Effect of Trial Participation in Sort Versus Weight Treatments

	Changed Farming Techniques		Pod Size (Grams)		Distance Between Pods (Cm)	
	(1)	(2)	(3)	(4)	(5)	(6)
Sort * After Trial	0.089	0.100	3.944	4.657		
	(0.065)	(0.077)	(4.461)	(5.310)		
Weight * After Trial	0.052	0.053	-9.257	-8.929	0.289	0.304
	(0.075)	(0.089)	(6.610)	(7.882)	(0.328)	(0.387)
Sort * After Summary Data	0.141	0.153	10.908	11.768		
	(0.075)*	(0.091)*	(4.418)**	(5.286)**		
Weight * After Summary Data	0.187	0.192	2.185	2.093	0.226	0.172
	(0.095)*	(0.114)*	(5.819)	(7.002)	(0.303)	(0.362)
Hamlet Fixed Effects	X		X		X	
Farmer Fixed Effects		X		X		X
Observations	684	684	684	684	499	499
Mean of Dependent Variable for the Control Group:						
After Trial	0.10	0.10	97.68	97.68	15.39	15.39
After Summary Data	0.11	0.11	95.39	95.39	15.27	15.27

Notes: This table provides the coefficient estimates of the effect of the different treatments on farming methods after the trial (follow-up 1) and after observing the summary data (follow-up 2), conditional on baseline farming methods. Changed Farming Techniques includes self-reported changes in pod size and distances, while pod size and distance between pods are enumerator measured. All regressions are estimated using OLS and standard errors are clustered at the farmer level. Statistical significance is denoted by: *** p<0.01, ** p<0.05, * p<0.10.

- Consistent with **Schwartzstein (JEEA)** limited attention model
  - Optimize when pay attention
  - But completely miss some variables, do not realize they are relevant

Flat Rental Puzzle

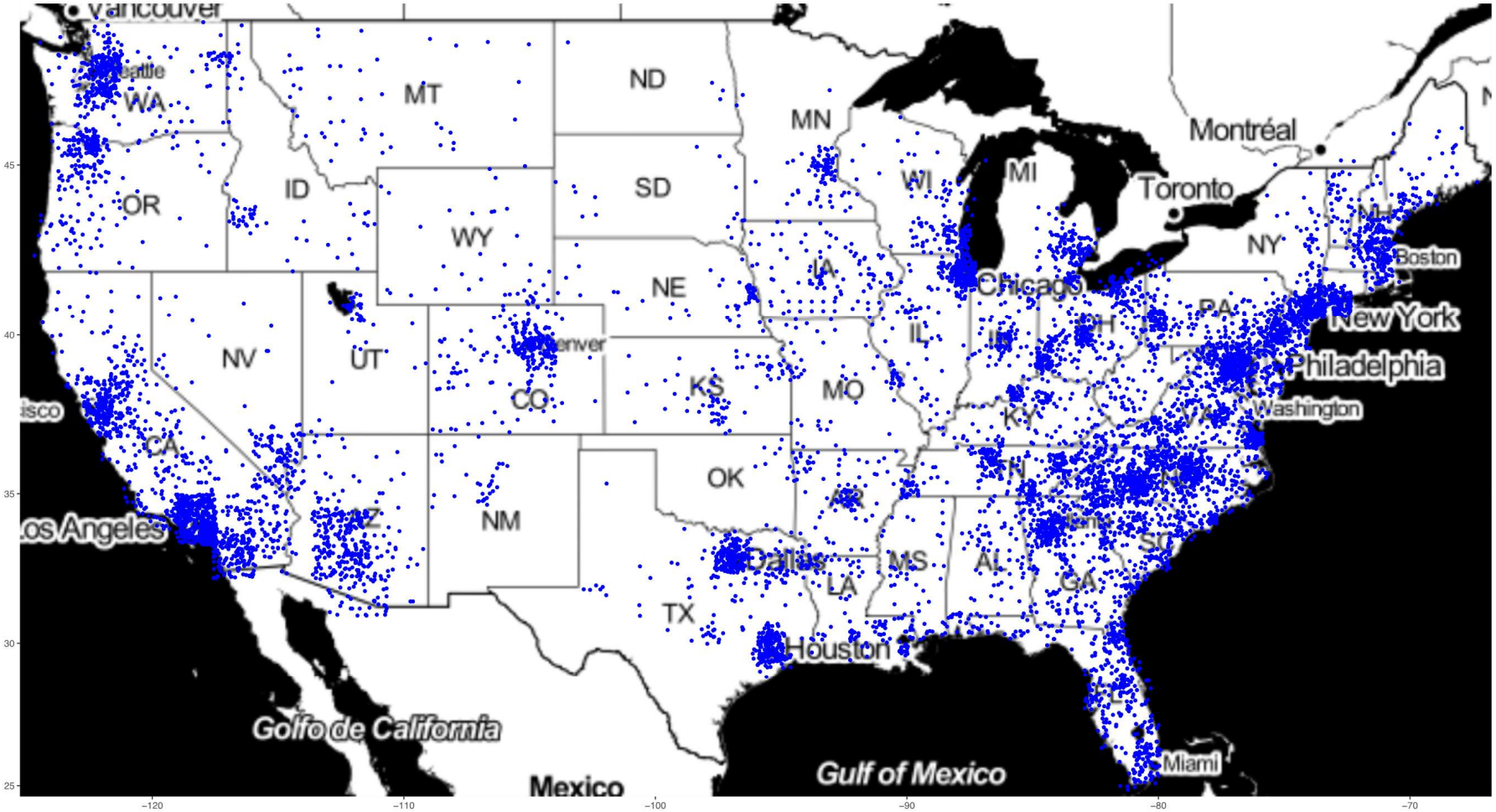
- **Cho and Rust (RES 2009)**
- All major rental car companies (Rent-a-Wreck exception) adopt uniform pricing
  - Keep cars of only up to 3 years
  - Charge same price for all cars
  - Sell after 3 years on used car market at huge discount
- Structural estimation of model of car rental
  - Can do better instead keeping cars for 6 years
  - (Cars do not break so often + consumers do not care)
  - Give small discount to consumers that rent older cars
- Run small field experiment with a dealership –> Increase profits by 20-30%
- Yet company did not change policy!

Some other examples

- **Bloom and van Reenen (QJE 2007)** and follow up
  - Measure managerial skill with suvey of top managers
  - Plenty of variation
  - Correlates with firm productivity
- **Goldfarb and Xiao (AER 2017):** Considers entry into a market
  - Model entry as in a k levels of thinking mode
  - Some entrants do not correctly anticipate entry decisions of others
  - Intuition: Enter strong market, without thinking that others enter too –> Later forced to exit
- **DellaVigna and Gentzkow (2017)**: Price rigidities but *across* stores in a chain

Data

- Nielsen RMS scanner data from Kilts Center 2006-14
  - Grocery, drug, and mass merchandise
  - Price is weekly $\frac{revenue}{units}$
  - 73 chains, 22,680 stores, $191bn annual revenue
- Store income: average home zip income of Homescan panelists who shop at store, weighted by # trips
- 10 categories ("modules") with high revenue & broad coverage
  - Soda, soup, cat food, chocolate, coffee, cookies, bleach, toilet paper, yogurt, orange juice
  - Top UPC in each (module, year) by coverage across chains and weeks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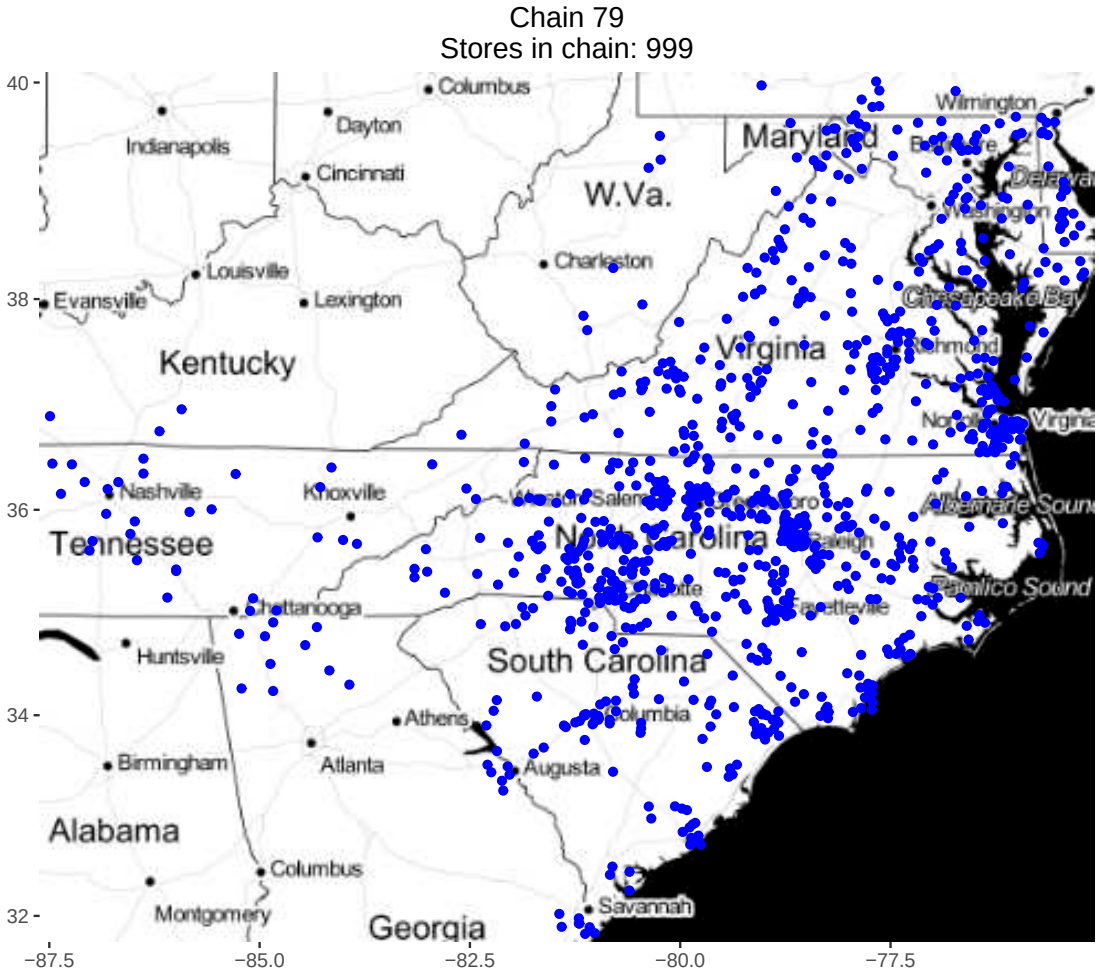
Example of Pricing: Chain 79



Example of Pricing: Chain 79

			Price				
Store	State	Income	Average	6/2/12	6/9/12	6/16/12	6/23/12
1	NC	$12,500	3.390	3.79	3.00	3.00	3.26
2	VA	$21,000	3.288	3.79	3.00	3.00	3.79
3	DE	$24,000	3.293	3.79	3.02	3.02	3.79
4	MD	$29,000	3.300	3.79	3.03	3.18	3.67
5	SC	$36,000	3.300	3.79	3.00	3.00	3.79
6	MD	$48,500	3.302	3.79	3.02	3.00	3.79

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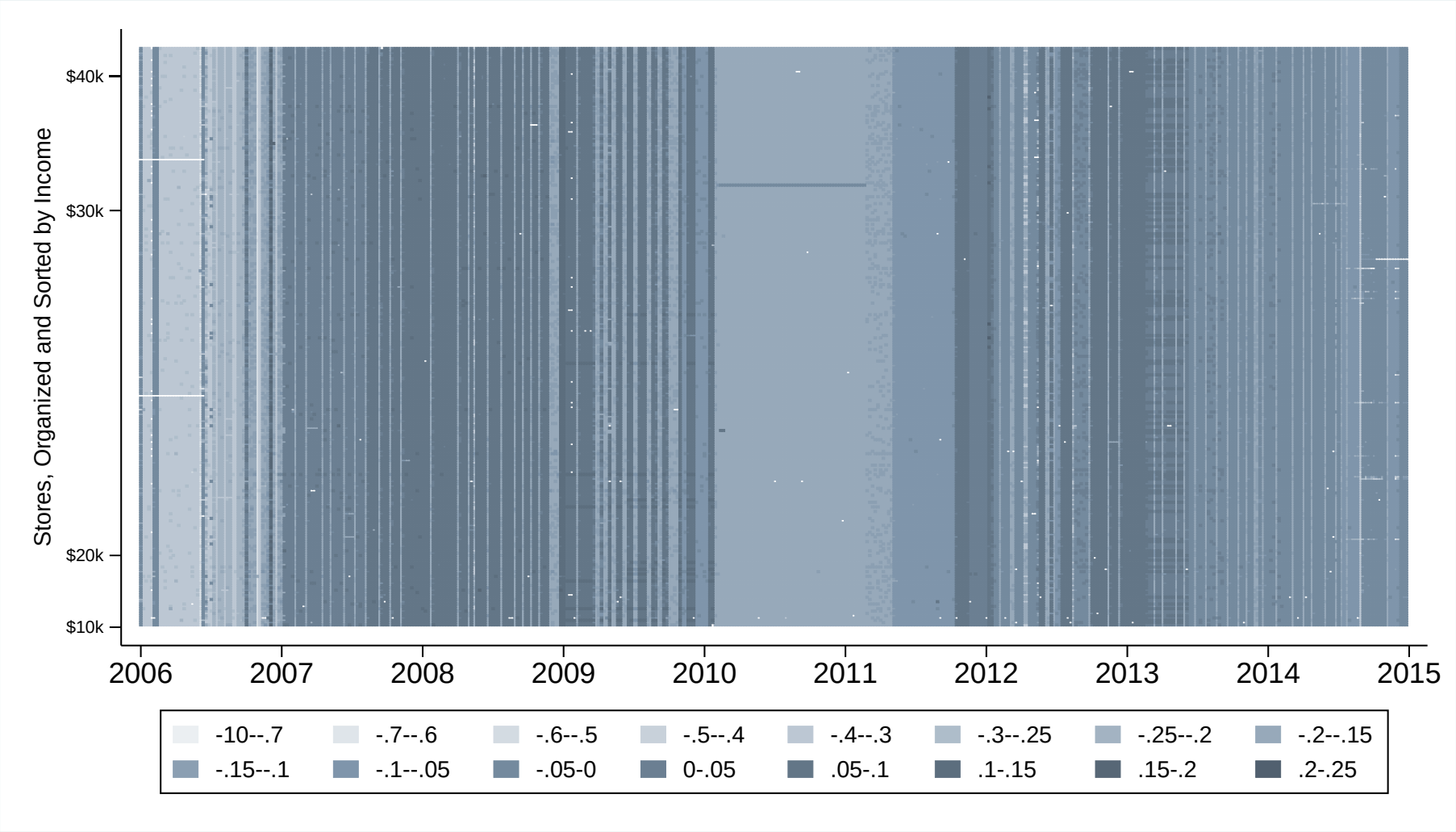

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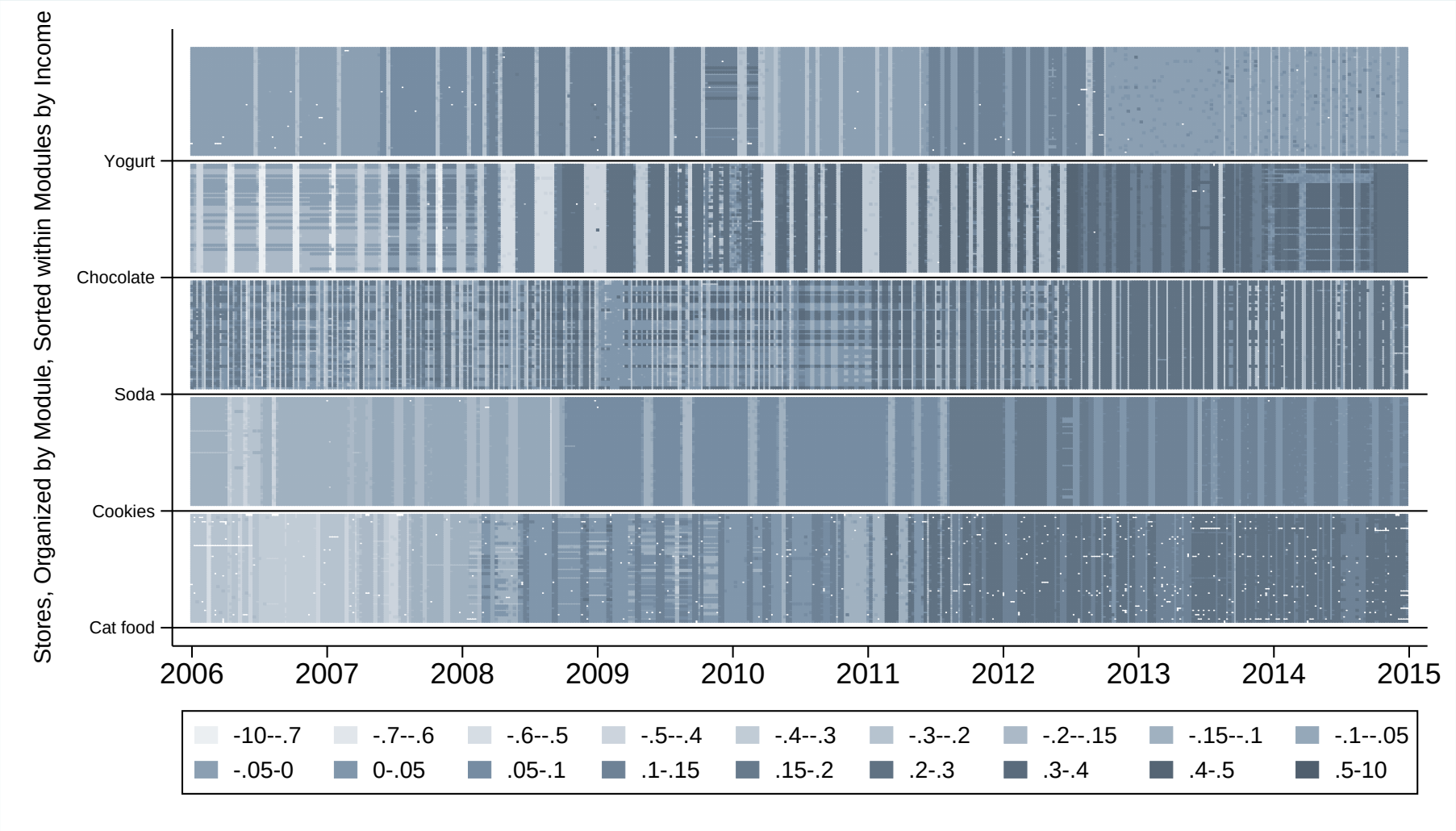


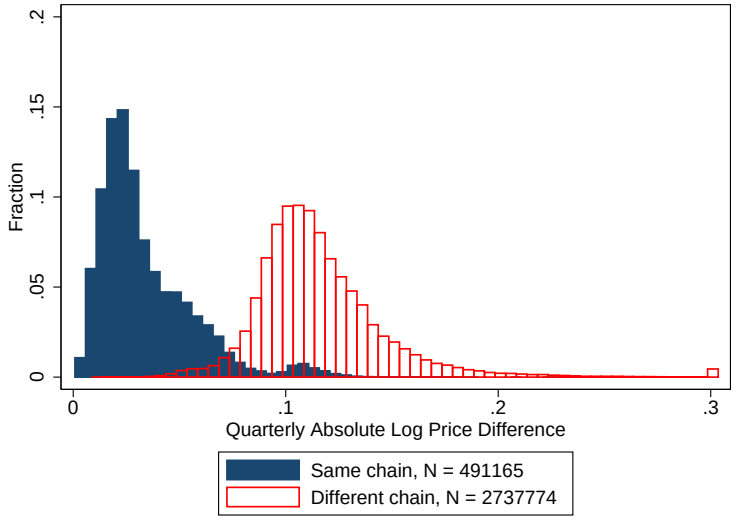
Similarity Measures

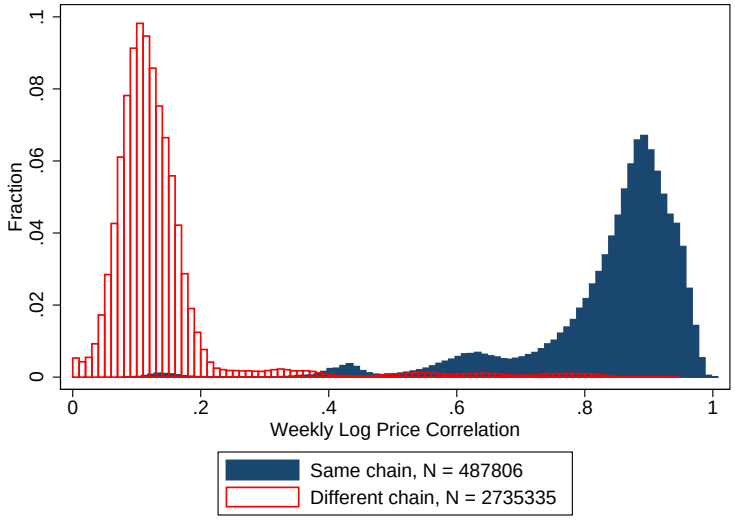
For each pair of stores i and j in chain c, average across products and quarters:

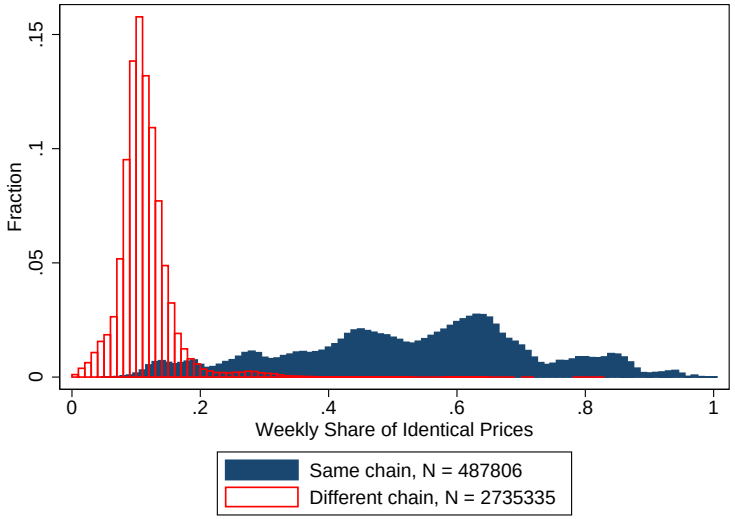
1. Absolute difference in log quarterly prices (0.026)
2. Correlation in deviation from quarterly mean (0.90)
3. Share of prices that differ by <1% (0.65)

(Values for chain 79 shown in gray)

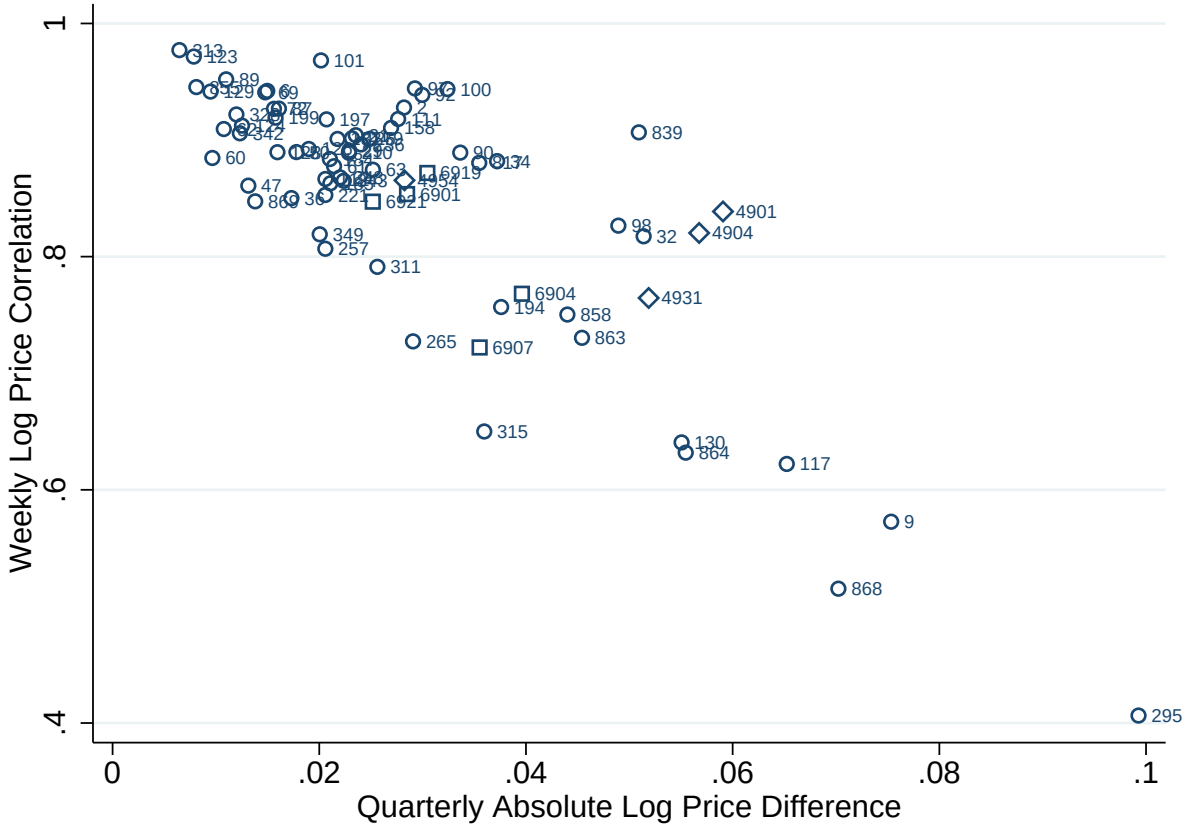
Similarity Measures







Similarity Measures: Chain-Level Averages

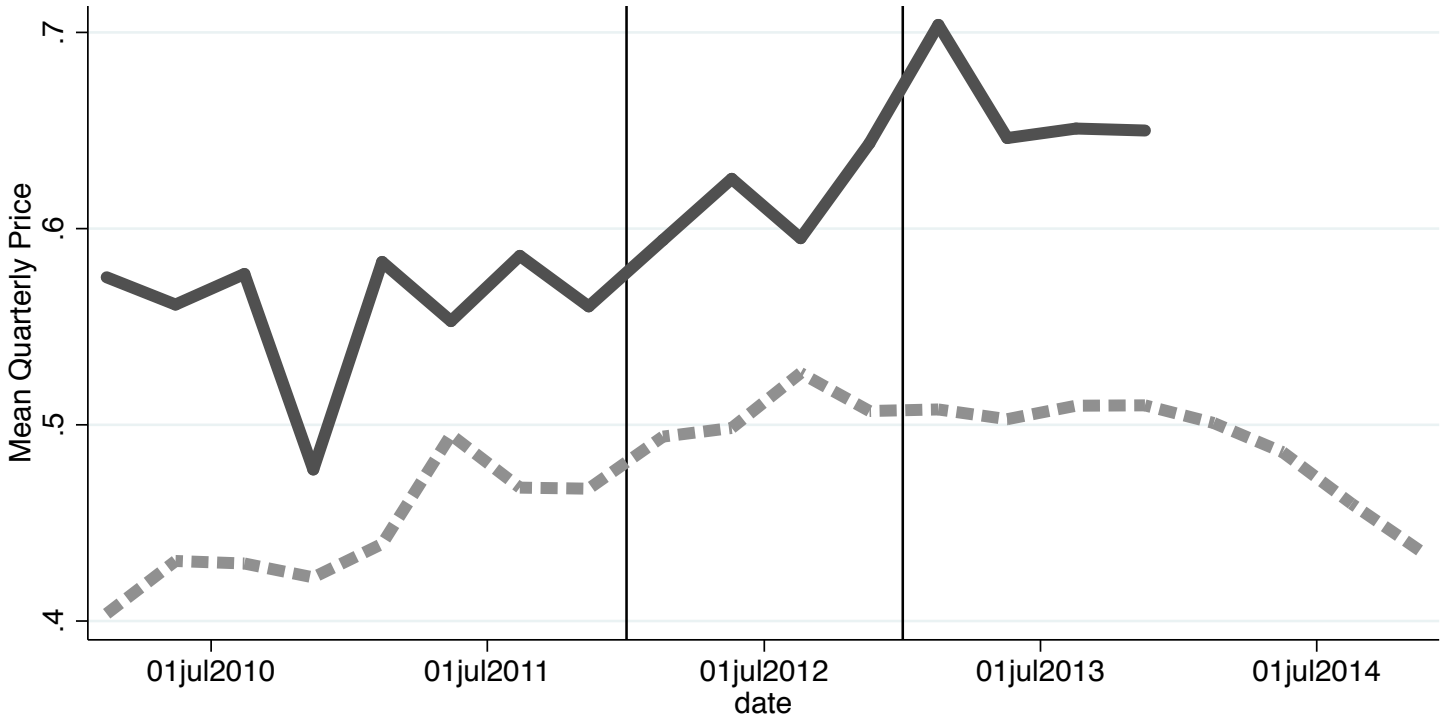


- Relationship between weekly correlation and quarterly absolute log price difference is not mechanical

Merger Event Studies

- Could price uniformity depend on time-varying common shocks?
- Consider stores that switch chain: Does pricing switch?
- In 2012, 15 of 29 stores in chain 63 acquired by chain 839

Cat Food Prices (Quarterly)



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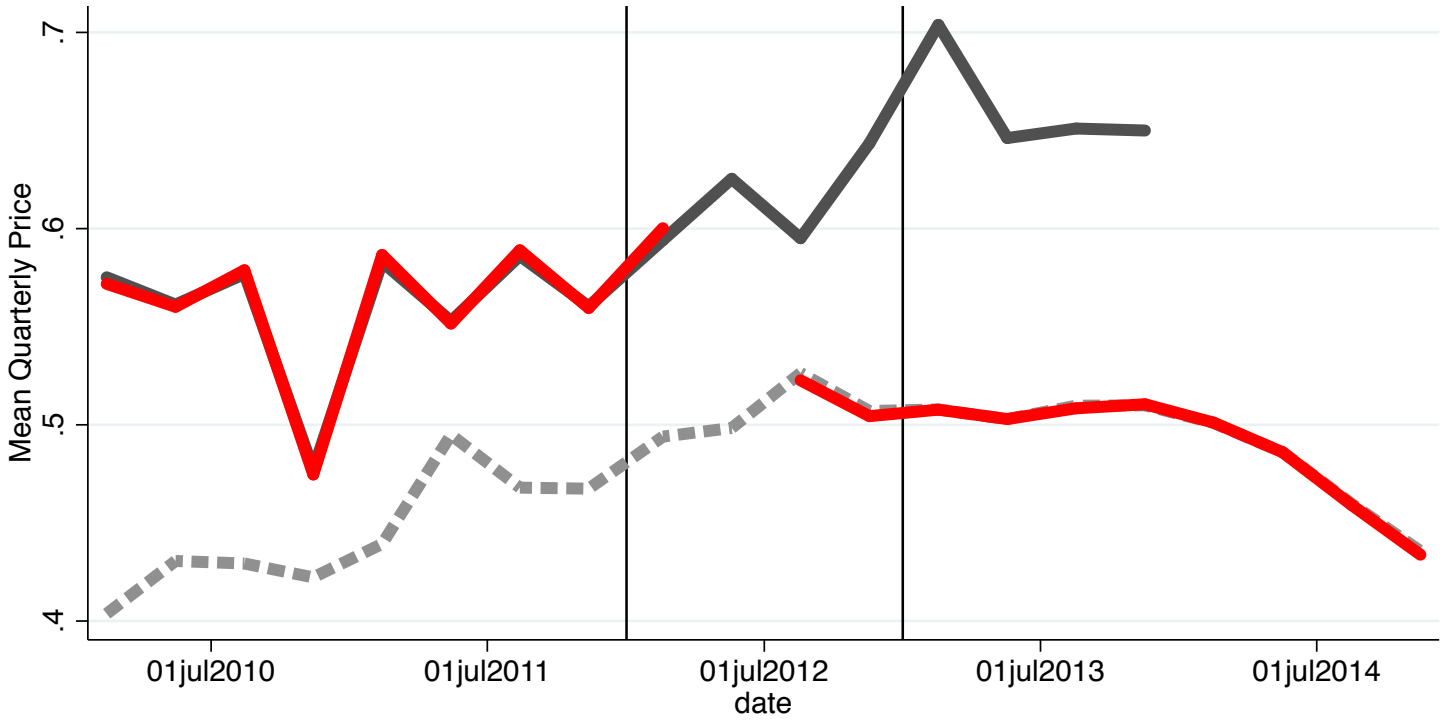
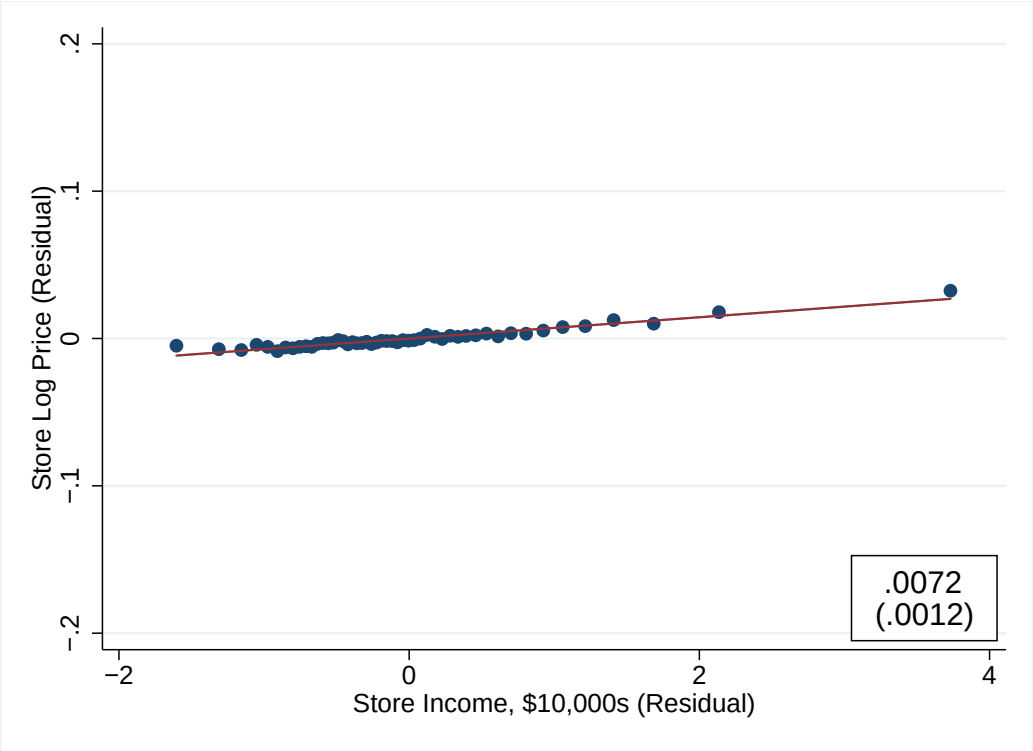


Price vs. Income

- How does price respond to local demographics (income)?
  - Within-chain: compare stores within a chain
  - Positive, but **very flat** relationship.

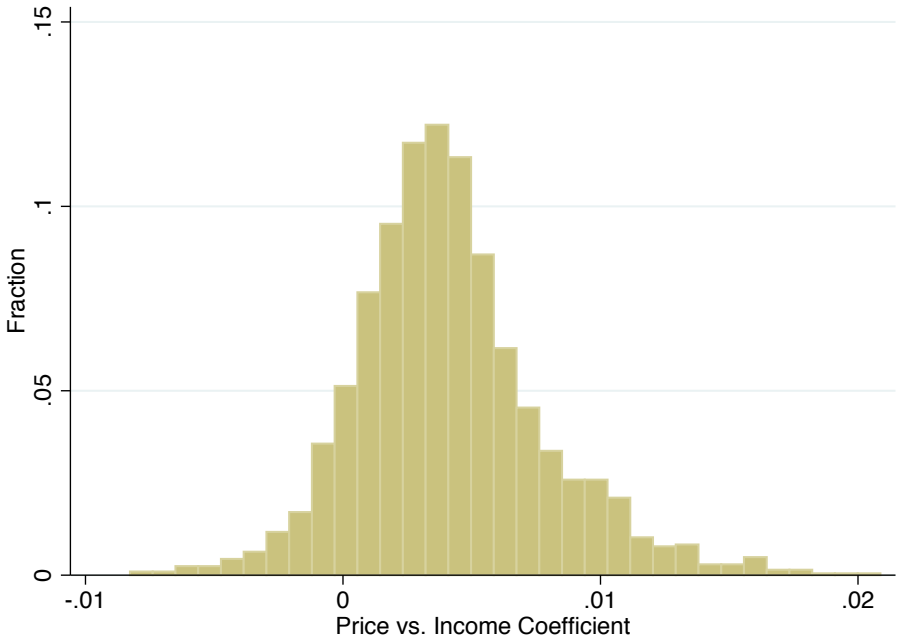


- Is this within-chain price-income slope similar across products?

Price vs. Income

- Estimate for 2,047 products – Compare to 0.0072

  2,047 products, product-specific slope, food stores



- Explanation?

Model

- For chain c and products j

$$\Pi_c = \sum_{j,s \in c} \left(P_{sj} - c_j\right) Q_{sj}\left(P_{sj}\right) - FixedCost_s$$

- **Assume**
  1. Constant elasticity demand $\left(Q_{sj} = k_{sjw} P_{sj}^{\eta_s}\right)$
  2. Constant marginal cost
  3. No cross-product substitution
  4. Myopic firm

- **Result**

$$\log P_{sj}^* = \log\left(\frac{\eta_s}{1+\eta_s}\right) + \log\left(c_j\right)$$

Estimation: Elasticities

- For each store s:

$$\log(Q_{jt}) = \delta_{j,year} + \gamma_{j,week} + \eta \log(P_{jt}) + \nu_{jt}$$

where t indexes weeks, $\delta_{j,year}$ are product-year fixed effects, and $\gamma_{j,week}$ are product-week-of-year fixed effects.

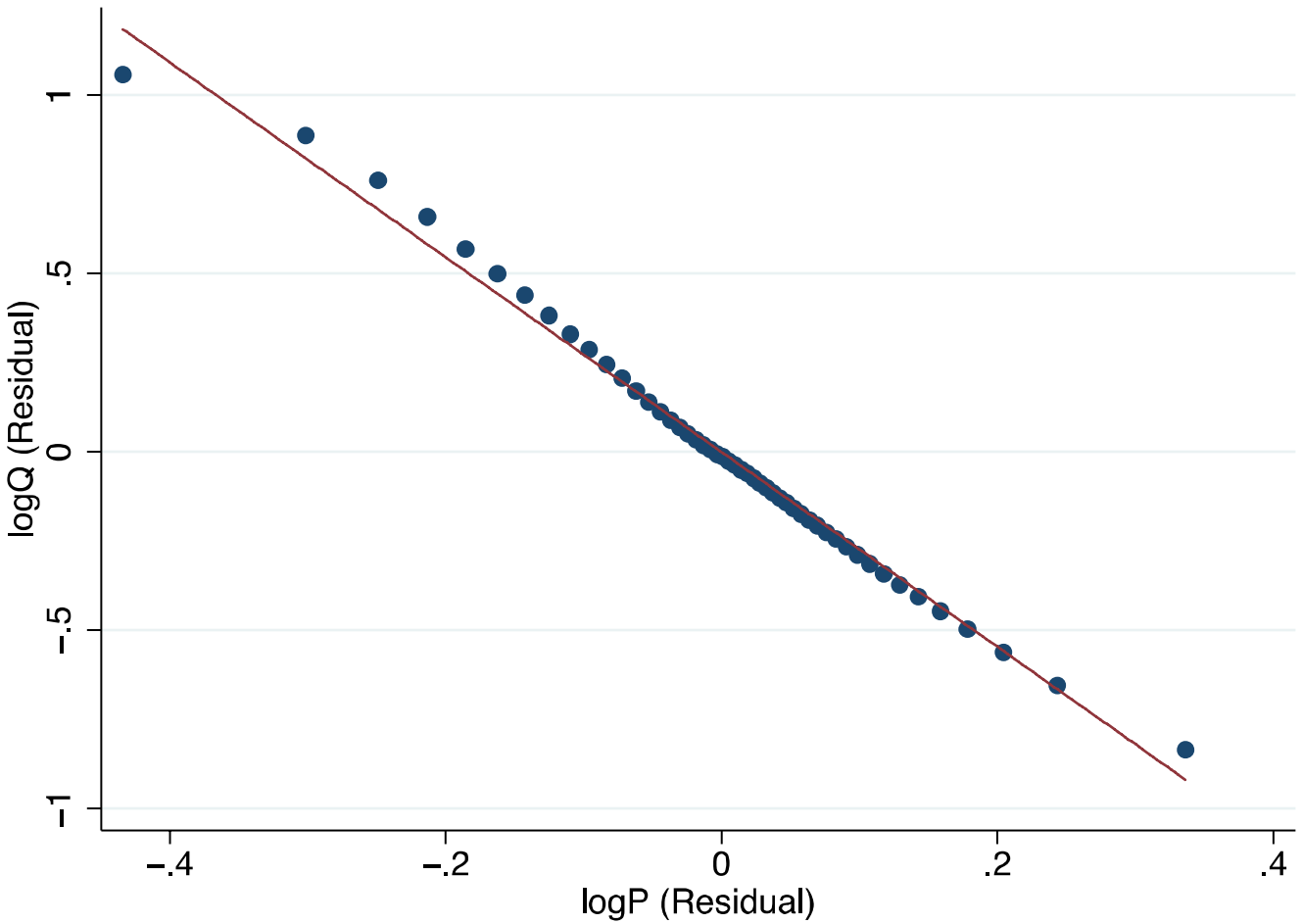
- Yields estimated average elasticity $\hat{\eta}_s$ for each store

- Use to test

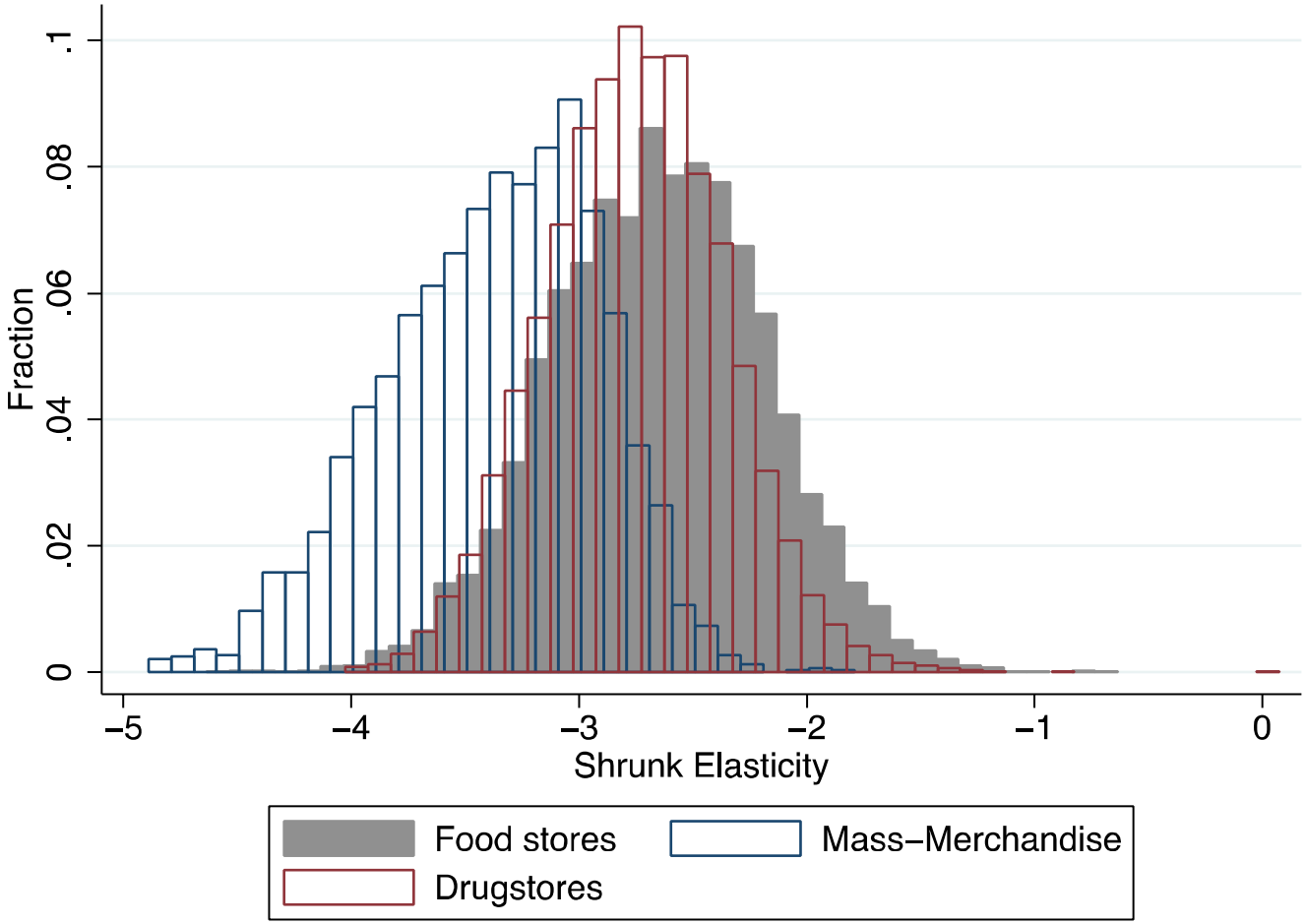
$$\log P^*_{sj} = \log\left(\frac{\eta_s}{1+\eta_s}\right) + \log(c_j)$$

- Regress store average $\log(P)$ on $\log\left(\frac{\hat{\eta}}{1+\hat{\eta}}\right)$ instrumenting with income to address measurement error

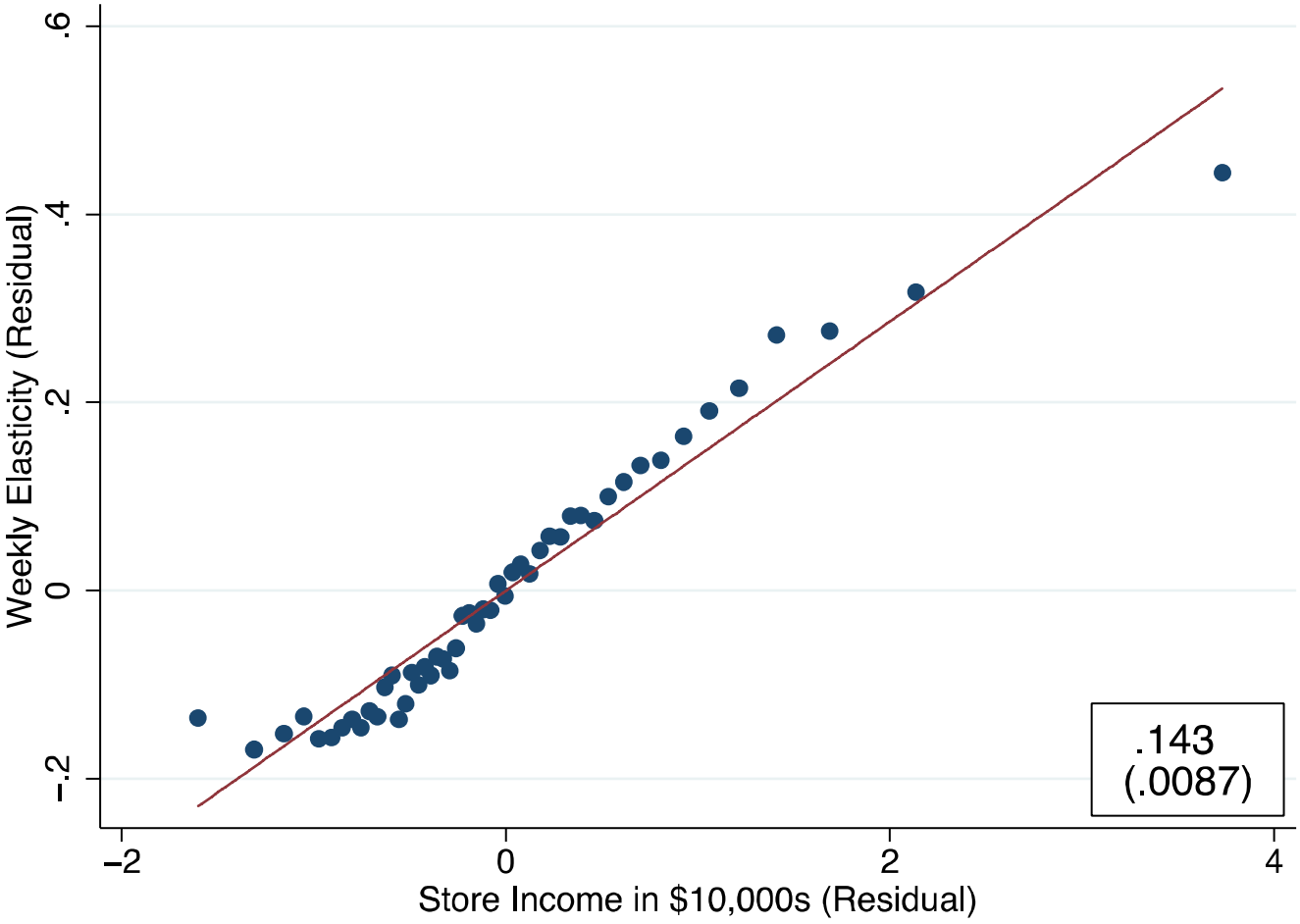
Assumption: Constant Elasticity



Distribution of Estimated Elasticities



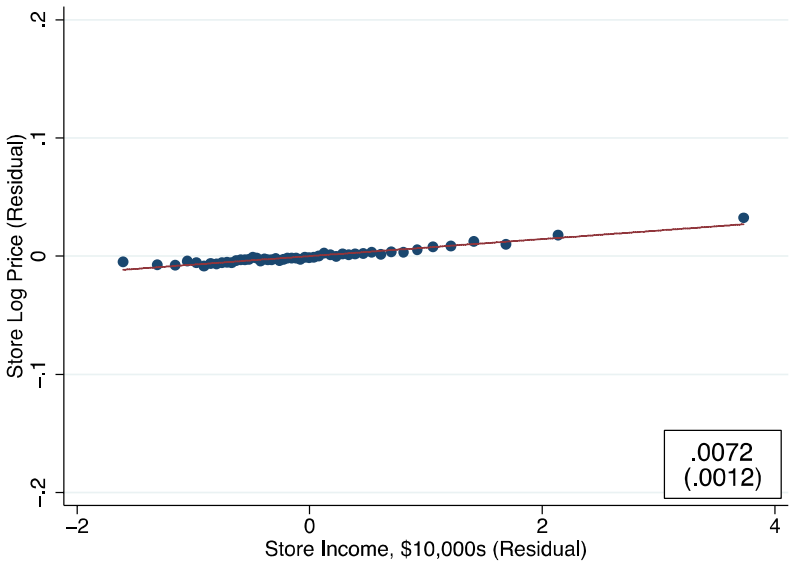
Elasticity vs. Income



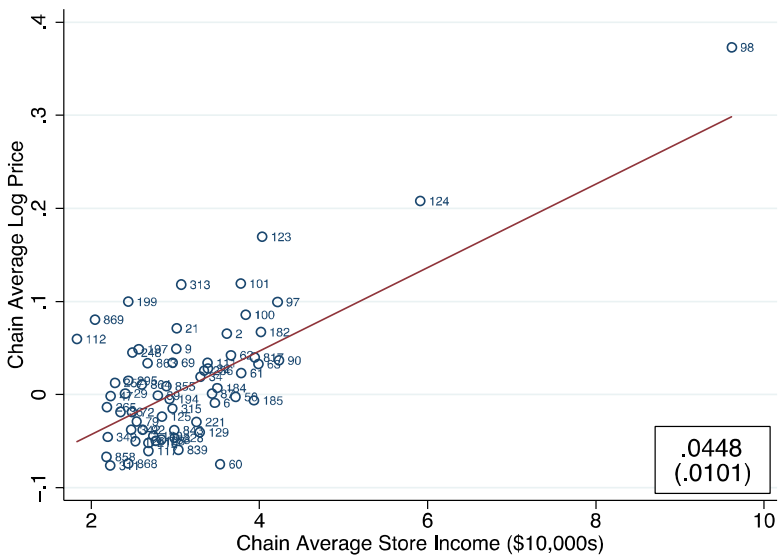
- Additional predictors of elasticity: competition, education

Reduced form: Within and Between

Within Chain



Between Chain



Main Results

	(1)	(2)
Dependent Variable:	Average log price	
Log (elast/1+elast)	0.0919	0.9440
	(0.0333)	(0.2358)
Variation*	Within	Between
Specification	IV	IV
Observations	9415	64

Note: Results for food stores only. Std errors clustered by chain in (1).

* Within: All variables at store level; includes chain fixed effects

Between: All variables collapsed to chain averages

Additional Evidence

	(1)	(2)
Dependent Variable:	Average log price in store	
Own store income	0.0044	0.0037
	(0.0013)	(0.0009)
Chain average income	0.0404	0.0363
	(0.0101)	(0.0109)
FE		County
Observations	9415	9415

Note: Standard errors clustered by chain.

Other Margins of Variation

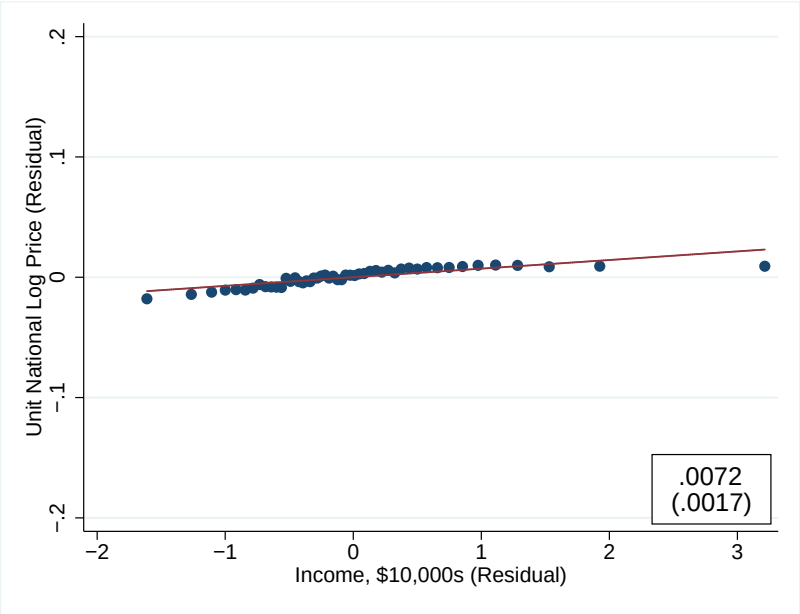
Are there similar within / between patterns for other retail choices?

Product Assortment (Average price of product *carried*) - Food stores

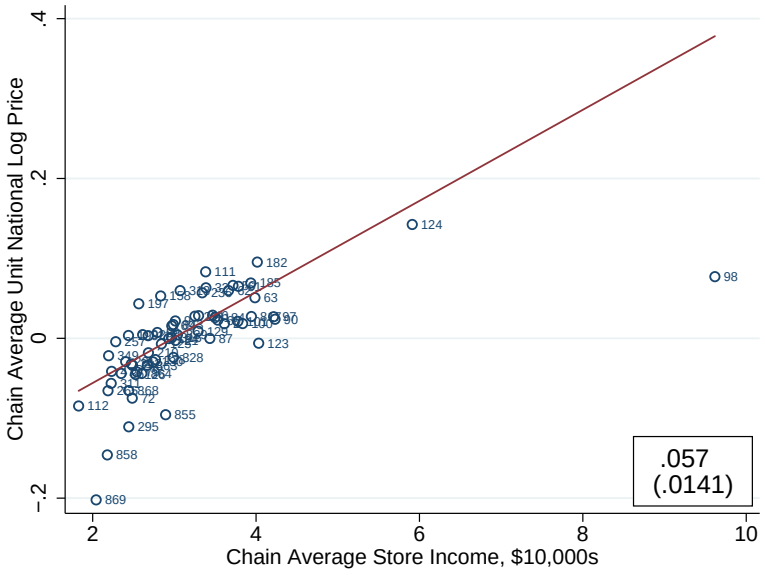
- For each product, compute average national log(unit price)
- In each store, average (national) price over items with positive sales in each store-year
  - This is identical to how we construct our price measure

Product Assortment

Within Chain



Between Chain



- Similar results using share of products in top 10% and top 25% of national unit price, share organic, and share generic

Lost Profit

- Compare total operating profit under:
  - Optimal pricing
  - Uniform pricing
  - Observed price-elasticity slope
- Additional estimates
  - Marginal cost: Assume chain average price = optimal uniform price
  - Fixed cost: Match average profit margins in Montgomery (1997)

	Mean	10th	Median	90th
Chain-Level (N=73)				
Optimal vs Uniform	8.84%	2.97%	7.12%	16.43%
Optimal vs Actual Price-Elasticity Slope	6.99%	2.18%	5.60%	12.30%

Robustness

- Demand Endogeneity
  - IV with avg. $log\left(P_{jt}\right)$ of stores in same chain in other DMAs
    1. Store level
    2. DMA level controlling for DMA-week shocks
- Cross-Product Substitution
  - Reproduce main results using module level price and quantity indicies
- Short-Run vs. Long-Run
  - Examine pattern of leads and lags
  - Use quarterly average prices and quantities
  - Use merger event studies as instruments

Possible Explanations

- Explanations
  - Data acquisition costs? Implausibly large
  - Collusion or National / online advertising
  - Behavioral Managers
  - Fairness / Regulatory concerns
- Which Chains Vary Prices More?
  - Many stores
  - Many states
  - High within-chain SD of income
  - *Broadly consistent with stories that involve fixed costs at the chain level*

Which Chains Vary Prices More?

Determinants of Flexible Pricing

Dependent Variable:	Price-Elasticity Relationship (IV) for Chain *c*				
	(1)	(2)	(3)	(4)	(5)
Log (No. of Stores)	0.0204***	0.0065			0.0150
	(0.0070)	(0.0084)			(0.0170)
Log (No. of States)	0.0065	0.0254*			0.0224*
	(0.0143)	(0.0136)			(0.0127)
Log (Average Yearly Store Sales)	0.0092	-0.0113			-0.0041
	(0.0222)	(0.0213)			(0.0347)
Standard Deviation of Store-level		0.0993***			0.1207***
Per-capita Income		(0.0326)			(0.0435)
Log Dollar Profit Loss from			0.0221**		-0.0080
Uniform Pricing			(0.0100)		(0.0177)
Percent Profit Loss from			-0.0032		-0.0013
Uniform Pricing			(0.0020)		(0.0035)
Share of Stores with Competitor				-0.0116	0.0035
Stores within 10 km				(0.0362)	(0.0324)
Share of Store with Same-Chain				0.0534	-0.0290
Stores within 10 km				(0.0708)	(0.0863)
Channel Fixed Effects	Y	Y	Y	Y	Y
Analytic Weights	Y	Y	Y	Y	Y
Number of observations	73	73	73	73	73
R-squared	0.547	0.661	0.276	0.042	0.668

Implications

- Mergers & competition
  - Less effect of local concentration
- Local economic shocks
  - Uniform pricing dampens response dramatically
  - State / county level shocks: 30% / 2% of response to national level shock
- Inequality
  - Relatively higher prices for poor
  - Relatively lower prices for rich
- Price Instruments
  - A product is cheap, or expensive, in a chain 'arbitrarily'
  - Use as price instrument (**Allcott, Lockwood, Taubinsky, 2018; Allcott, Diamond, and Dube, 2017**)

Section 4

Methodology: Markets and Non-Standard Behavior

What about Markets?

- Why don't market forces eliminate non-standard behavior?
- Common Chicago-type objection

- **Argument 1.** Experience reduces non-standard behavior.
  - Feedback often infrequent (house purchases) or noisy (financial investments)
  - Experience can exacerbate a bias if individuals are not Bayesian (Haigh and List 2004)
  - Not all non-standard features should be mitigated by experience(i.e., social preferences)
  - Experienced agents such as firms typically have little or no incentive to debias individuals

The Curse of Debiasing

- *Curse of Debiasing* (**Gabaix-Laibson QJE 2006**)
  - Credit Card A teaser fees on \$1000 balance:
    - \$0 for six months
    - \$100 fee for next six months
  - Cost of borrowing to company \$100 $\rightarrow$ Firm makes 0 profit in Perfectly Competitive market
  - Naive consumer:
    - Believes no borrowing after 6 months
    - Instead keeps borrowing
    - Expects cost of card to be \$0, instead pays \$100

Debiasing in Equilibrium?

- Can Credit Card B debias consumers and profit from it?
  - Advertisement to consumers: 'You will borrow after 6 months!'
  - Offer rate of
    - \$50 for six months
    - \$50 for next six months
- What do consumers (now sophisticated) do?
  - Stay with Card A
    - Borrow for 6 months at \$0
    - Then switch to another company

- No debiasing in equilibrium
- Suppose Credit Card B can identify naive consumer
  - If debias, then lose consumer
  - Rather, take advantage of consumer

Aggregate Market Outcomes Unaffected?

- **Argument 2.** Even if experience or debiasing does not eliminate the biases, the biases will not affect aggregate market outcomes
  - Arbitrage $\rightarrow$ Rational investors set prices
  - However, limits to arbitrage (DeLong et al., 1991) $\rightarrow$ individuals with non-standard features affect stock prices
  - In addition, in most settings, there is no arbitrage!
    - Example: Procrastination of savings for retirement
    - (Keep in mind SMRT plan though)
  - Behavioral IO: Non-standard features can have a disproportionate impact on market outcomes
    - Firms focus pricing on the biases
    - **Lee and Malmendier (AER 2011)** on overbidding in eBay auctions

Results

Table V. Disproportionate Influence of Overbidders

		Observations	(Percent)
Auction-level sample			
Does the auction end up overbid?	No	78	56.52%
	Yes	60	**43.48%**
Total		138	100.00%
Bidder-level sample			
Does the bidder ever overbid?	No	670	83.02%
	Yes	137	**16.98%**
Total		807	100.00%
Bid-level sample			
Is the bid an over-bid?	No	2,101	89.29%
	Yes	252	**10.71%**
Total		2,353	100.00%

Overbidding is defined using the final price.

- Bidders with bias have *disproportionate* impact
- Opposite of Chicago intuition

Section 5

Behavioral Political Economy

Setup

- Interaction between:
  - (Smart) Politicians:
    - Personal beliefs and party affiliation
    - May pursue voters/consumers welfare maximization
    - BUT also: strong incentives to be reelected
  - Voters (with biases):
    - Low (zero) incentives to vote
    - Limited information through media
    - Likely to display biases

Behavioral Political Economy – A Roadmap

- Social Preferences overcome public good problem
  - Turnout (Harsanyi; Knack; Blais; Morton; DellaVigna et al.)
  - Coordination in progests (Passarelli and Tabellini – below)
  - Vote buying (Finan and Schechter – below)
- Reference-dependence of voters
  - Status quo in policies (Alesina and Passarelli)
  - Lack of support for redistribution (Charite, Fisman, and Kuziemko)
- Limited attention and memory
  - Order effects at ballot (Ho and Imai)
  - Misvoting (Shue and Luttmer)
  - Retrospective voting (Wolfers)
  - Optimal inattention (Matejka and Tabellini)

Behavioral Political Economy – A Roadmap

- Persuasion
  - Persuasion and voting (DellaVigna and Kaplan)
- Behavioral Biases
  - Overconfidence (Snowberg)
  - Correlation neglect (Levy and Razin)
- Rational politician best-respond to voter biases
  - Aid to disasters (Eisensee and Stromberg – below)

Eisensee and Stromberg – Introduction

- **Eisensee and Stromberg (QJE 2007).** Setting:
  - Natural Disasters occurring throughout the World
  - US Ambassadors in country can decide to give Aid
  - Decision to give Aid affected by
    - Gravity of disaster
    - Political returns to Aid decision
- Idea: Returns to aid are lower when American public is distracted by a major news event

Measuring Major News

- Main Measure of Major News: median amount of Minutes in Evening TV News captured by top-3 news items (Vanderbilt Data Set)

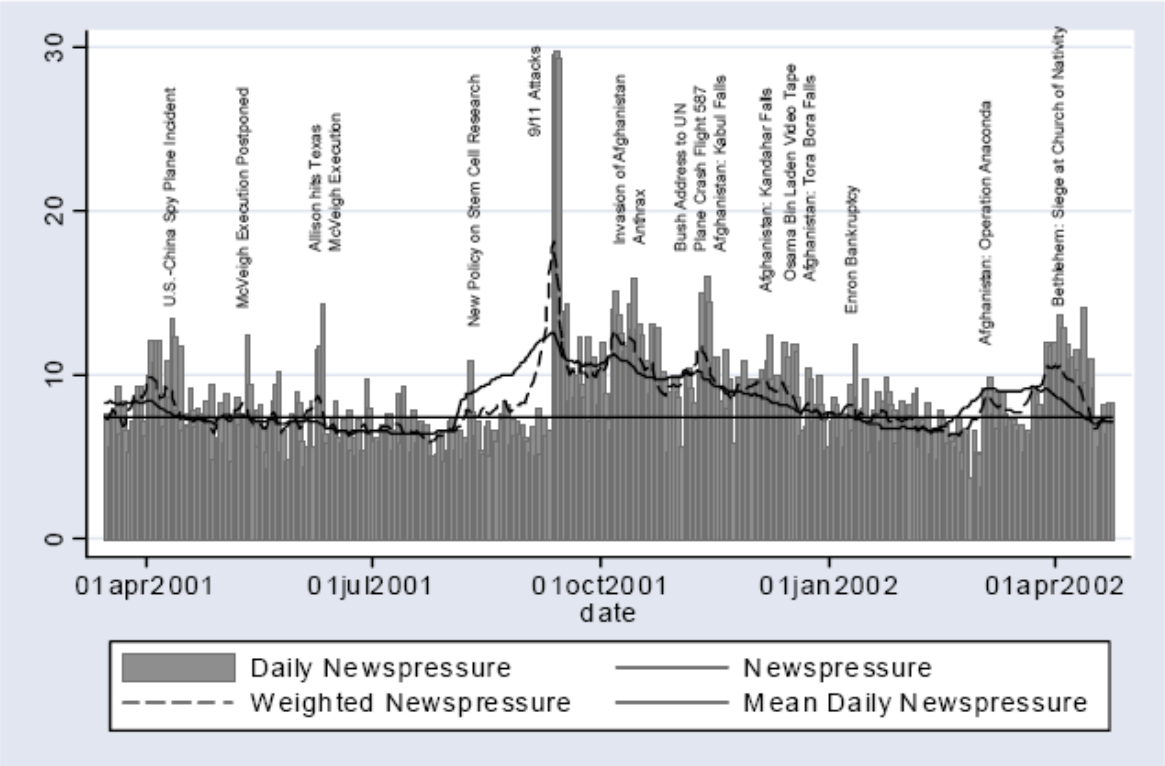


FIGURE IV
News Pressure (Minutes) during 405 Days, 15 March 2001 – 23 Apr 2002, by Day

Significant Dates

- Dates with largest news pressure

TABLE III

DATES OF TWO LARGEST *daily news pressure* AND MAIN STORY, BY YEAR

Year	Date	Main News Story
2003	14 Aug	*New York City Blackout*
	22 Mar	*Invasion of Iraq: Day 3*
2002	11 Sep	*9/11 Commemoration*
	24 Oct	*Sniper Shooting in Washington: Arrest of Suspects*
2001	13 Sep	*9/11 Attack on America: Day 3*
	12 Sep	*9/11 Attack on America: Day 2*
2000	26 Nov	*Gore vs. Bush: Florida Recount - Certification by Katherine Harris*
	8 Dec	*Gore vs. Bush: Florida Recount - Supreme Court Ruling*
1999	1 Apr	*Kosovo Crisis: U.S. Soldiers Captured*
	18 Jul	*Crash of Plane Carrying John F. Kennedy, Junior*
1998	16 Dec	*U.S. Missile Attack on Iraq*
	18 Dec	*Clinton Impeachment*
1997	23 Dec	*Oklahoma City Bombing: Trial*
	31 Aug	*Princess Diana's Death*
1996	18 Jul	*TWA Flight 800 Explosion*
	27 Jul	*Olympic Games Bombing in Atlanta*
1995	3 Oct	*O.J. Simpson Trial: The Verdict*
	22 Apr	*Oklahoma City Bombing*
1994	17 Jan	*California Earthquake*
	18 Jun	*O.J. Simpson Arrested*
1993	17 Jan	*U.S. Missile Attack on Iraq*
	20 Apr	*Waco, Texas: Cult Standoff Ends in Fire*
1992	16 Jul	*Perot Quits 1992 Presidential Campaign*
	1 May	*Los Angeles Riots*

Observations

- 5,000 Natural Disasters in 143 countries between 1968 and 2002 (CRED)
  - 20 percent receive USAID from Office of Foreign Disaster Assistance (first agency to provide relief)
  - 10 percent covered in major broadcast news
  - OFDA relief given if (and only if) Ambassador (or chief of Mission) in country does Disaster Declaration
  - Ambassador can allocate up to $50,000 immediately
- Estimate

$$Relief = \alpha News + \beta X + \varepsilon$$

- Below: *News* about the Disaster is instrumented with:
  - Average News Pressure over 40 days after disaster
  - Olympics

Results

TABLE IV
EFFECT OF THE PRESSURE FOR NEWS TIME ON DISASTER *News* AND *Relief*

	Dependent variable: *News*				Dependent variable: *Relief*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
News Pressure	-0.0162	-0.0163	-0.0177	-0.0142	-0.0117	-0.0119	-0.0094	-0.0078
	(0.0041)***	(0.0041)***	(0.0057)***	(0.0037)***	(0.0045)***	(0.0045)***	(0.0058)	(0.0040)**
Olympics	-0.1078	-0.1079	-0.0871	-0.111	-0.1231	-0.1232	-0.1071	-0.1098
	(0.0470)**	(0.0470)**	(-0.0628)	(0.0413)***	(0.0521)**	(0.0521)**	(0.0763)	(0.0479)**
World Series	-0.1133				-0.1324			
	(-0.1065)				(0.1031)			
log Killed			0.0605				0.0582	
			(0.0040)***				(0.0044)***	
log Affected			0.0123				0.0376	
			(0.0024)***				(0.0024)***	
imputed log Killed				0.0491				0.0442
				(0.0034)***				(0.0037)***
imputed log Affected				0.0151				0.0394
				(0.0020)***				(0.0020)***
Observations	5212	5212	2926	5212	5212	5212	2926	5212
R-squared	0.1799	0.1797	0.3624	0.2875	0.1991	0.1989	0.4115	0.3726

Linear probability OLS regressions. All regressions include year, month, country and disaster type fixed effects. Regressions with imputed values ((4) and (8)) also include fixed effects for the interaction of missing values and disaster type. Robust standard errors in parentheses:* significant at 10%; ** significant at 5%; *** significant at 1%.

- Results: 2 s.d. increase in News Pressure (2.4 extra minutes) decrease
  - probability of coverage in news by 4 ptg. points (40 percent)
  - probability of relief by 3 ptg. points (15 percent)

Voter Reciprocity

- **Finan and Schechter (2012 EMA):** Politicians target voter reciprocity
  - Motivation is vote buying
  - Politicians do favors to individuals in the hope of the return of a vote
  - BUT: Vote is private, no way to enforce a contract
- Solution that makes the contract enforceable: reciprocity of voters
  - Voter that receives a gift takes into account the politician
  - In return, provides vote
- Similar to gift exchange in the workplace
  - Reciprocity helps enforcement of 'contract'

Finding Reciprocal Voters

- BUT: Vote-maximizing politician must find reciprocal voters
- Finan and Schechter do survey in Paraguay in 2002, 2007, and 2010
- Survey of voters:
  - In 2002 asked to play trust game
    - First mover has allocation of 8k and decide how much to send to recipient: 0, 2k, 4k, 6k, 8k
    - Money sent to recipient is tripled
    - Recipient decides how much money to send back (strategy method)
    - Measure of reciprocity: Share returned by recipient when receiving 12k+ versus when receiving 6k

Finding Reciprocal Voters

- In 2007 ask voters whether targeted by vote-buying:
  - '*whether, during the run-up to the 2006 elections, any political party offered them money, food, payment of utility bills, medicines, and/or other goods (excluding propaganda hats, shirts, and posters)*'
    - 26 percent say yes
- Survey of middlemen in 2010
  - Evidence that they know villagers well
  - Ex.: Correlation between actual years of schooling and middleman report: 0.73
  - (Lower correlation in prediction of amount sent in dictator game, 0.08)

Results

- Main evidence: clear correlation of self-reported vote-buying and reciprocity measure
- Social preferences used for evil purposes!

VOTE-BUYING AND RECIPROCITY

	Dependent Variable[a]				
	Individual Offered Something in Exchange for Vote				Individual Offered Something in Exchange for Vote (as Reported by the Middlemen)
	(1)	(2)	(3)	(4)	(5)
Reciprocity	1.259	1.318	1.207	1.294	0.382
	[0.512]**	[0.568]**	[0.640]*	[0.579]**	[0.223]*
Observations	139	139	103	139	314
Mean of dependent variable	0.23	0.23	0.23	0.23	0.47
Main controls	N	Y	Y	Y	Y
Controls for other personal traits	N	N	Y	N	N
Controls for social network	N	N	N	Y	N

What explains political participation?

- Olson (1965): Public good problem: Even if think participation is right, individually better off staying at home
  - Example 1: Riots and protests
  - Example 2: Voter turnout at the polls $\rightarrow$ Probability of being pivotal very small
- Series of papers introduce variants of social preferences to explain participation in political activities
- **Passarelli and Tabellini (JPE, 2017):**
  - Focus on protests
  - Assume negative reciprocity and role of emotions
  - Individuals treated poorly by government get glow from protesting

Model

- For individual i:
  - Cost of participating to protest ε_i
  - Psychological benefit of participation to protest a_i
  - Benefit a_i depends on aggrievement:

$$a_i = \begin{cases} 0 & \text{if} \quad V_i \geq \hat{V} \\ \omega \left(V - \hat{V} \right)^2 & \text{if} \quad V_i < \hat{V} \end{cases}$$

  - V_i is welfare of individual i with given policy
  - $\hat{V}$ is what individual thinks appropriate (can be self-biased)
  - Ad-hoc form of reference dependence
  - When aggrieved, individual willing to incur cost of participation because of glow from participation

DellaVigna, List, Malmendier, Rao (2017)

- Related idea: Explain voter turnout with social preferences
- Tie to social interactions
- Identify using field experiment design
- **DellaVigna, List, Malmendier, Rao (REStud 2017)**

Determinants of Voting

Four determinants of voting

1. Pivotality $\boldsymbol{pV}$

   p = subjective probability of being pivotal

   V = value of deciding the election

2. Warm glow $\boldsymbol{g}$

3. Cost of voting $\boldsymbol{c}$

   cost of voting

4. Social Image utility

Focus of this paper

   $\boldsymbol{s_V}$ = utility from saying one voted

   $\boldsymbol{s_N}$ = utility from saying one did not vote

   social image

   $\boldsymbol{L}$ = psychological cost of lying

   dishonesty

- Non-voters lie about voting if $s_V - L > s_N \leftrightarrow s_V - s_N > L$
- Voters lie if $s_N - L > s_V$

(Net) Expected Utility from Voting

Voting iff

$$\underbrace{pV + g - c}_{= \varepsilon} + N \underbrace{\left[\max\left(s_V, s_N - L\right) - \max\left(s_N, s_V - L\right)\right]}_{\text{= net utility gain from having voted, due to being asked once}} \geq 0$$

Can rewrite as: $N\Phi\left(s_v - s_L, L\right) + \varepsilon \geq 0$

where $\Phi\left(s_v - s_L, L\right) = \begin{cases} \min(s_V - s_N, L) & \text{if } s_V - s_N \geq 0 \\ \max(s_V - s_N, L) & \text{if } s_V - s_N < 0 \end{cases}$

Experimental Design

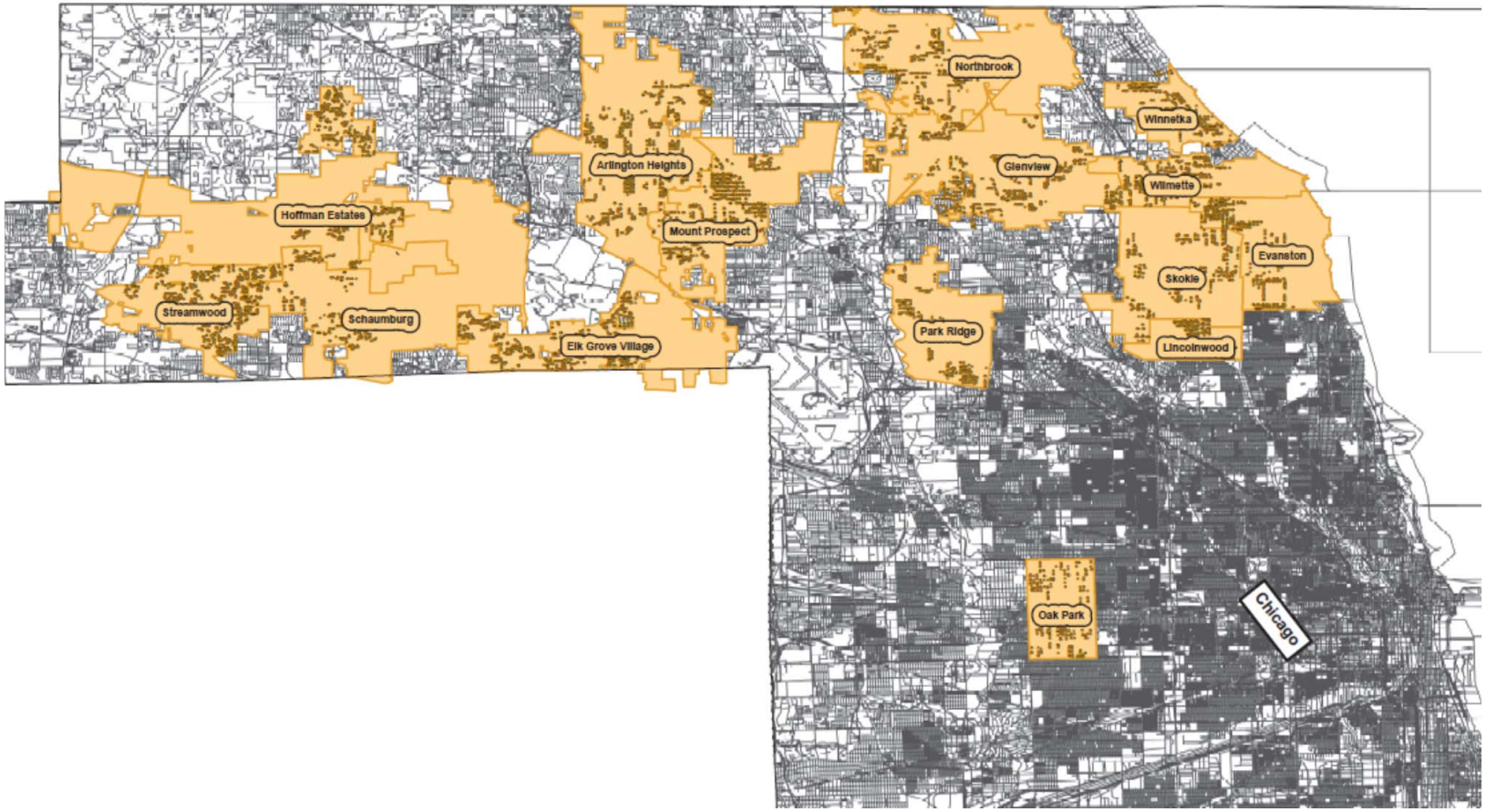
- Field experiment: door-to-door survey
  - Match households to voting records
  - Identify all-voter and all-non-voter households

- Cross-randomize
  1. Whether individuals receive advance notice of survey.
     - Individuals can avoid (or seek) surveyor at a cost.
  2. Vary payment and length of survey to estimate elasticity
  3. Incentives to lie / tell truth about voting.

- Get-Out-The-Vote experiment related to model
  - Inform some people that we will visit them after the election to ask whether they voted

Field Experiment - Implementation

- Single-family homes in towns around Chicago



Exp 1: Announcing Content of Survey

Control: Unannounced Visit

THE UNIVERSITY OF CHICAGO

University of Chicago Study

Researchers will visit this address tomorrow (/) between and to conduct a **5 minute survey.**

THE UNIVERSITY OF CHICAGO

University of Chicago Study

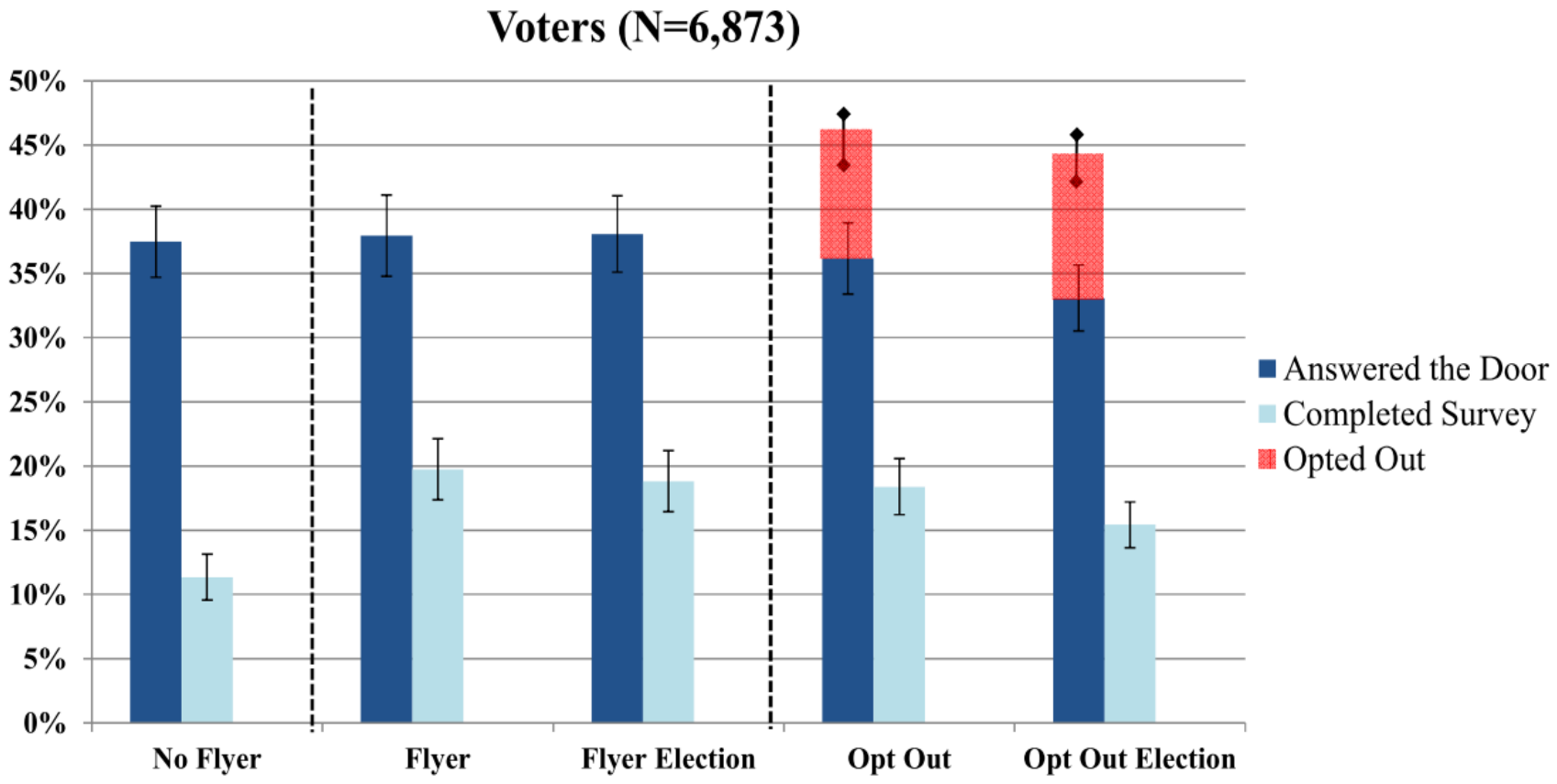
Researchers will visit this address tomorrow (/) between and to conduct a **5 minute survey on your voter participation in the 2010 congressional election.**

Model Predictions

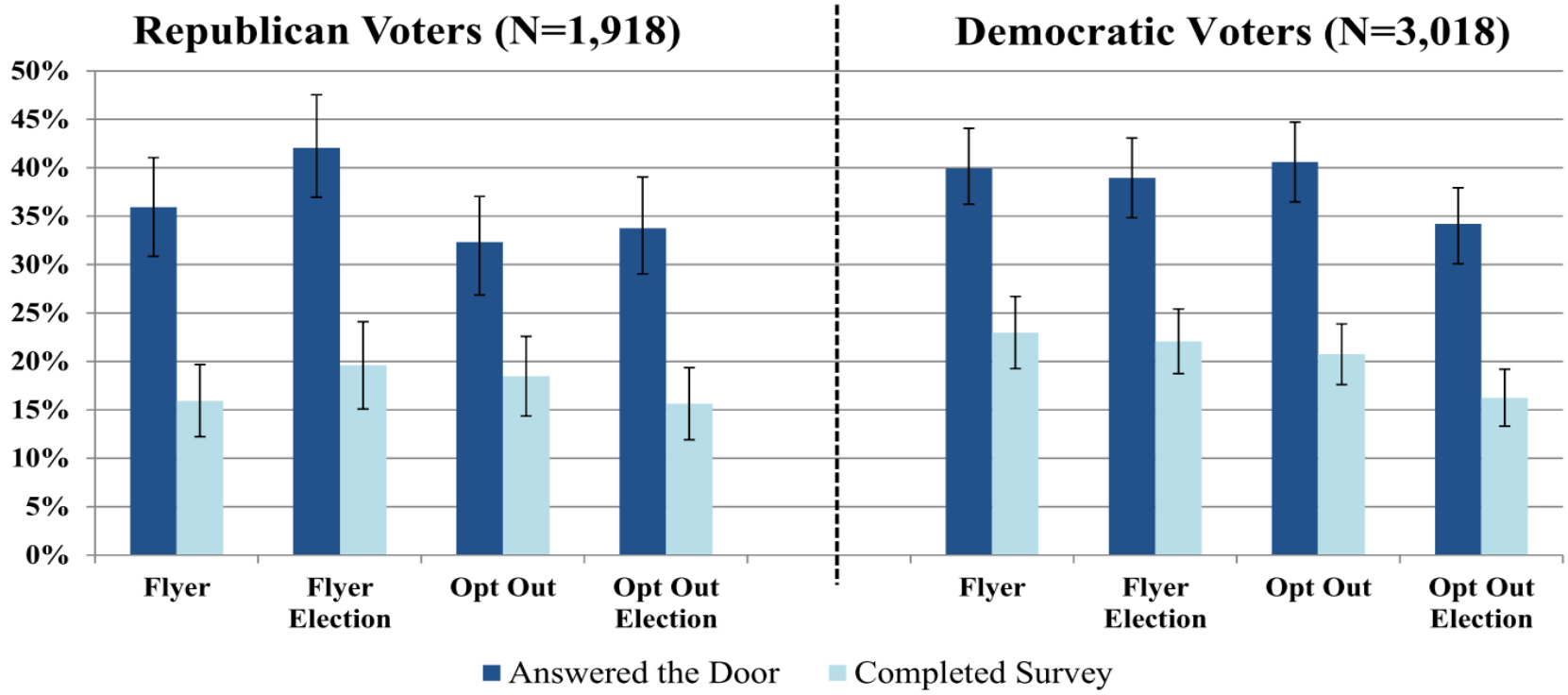
- **Prop. 1.** With pride in voting ($s_V > 0$), voters should be more likely to be at home and answer the door if informed of election survey
- **Prop. 2.** With stigma from not voting ($s_N < 0$), non-voters should be less likely to be at home and answer the door if informed of election survey

- **Prop. 3.** The probability of lying about voting should increase in the incentive to do so
- **Prop. 4.** The probability of voting should increase in the number of times asked N

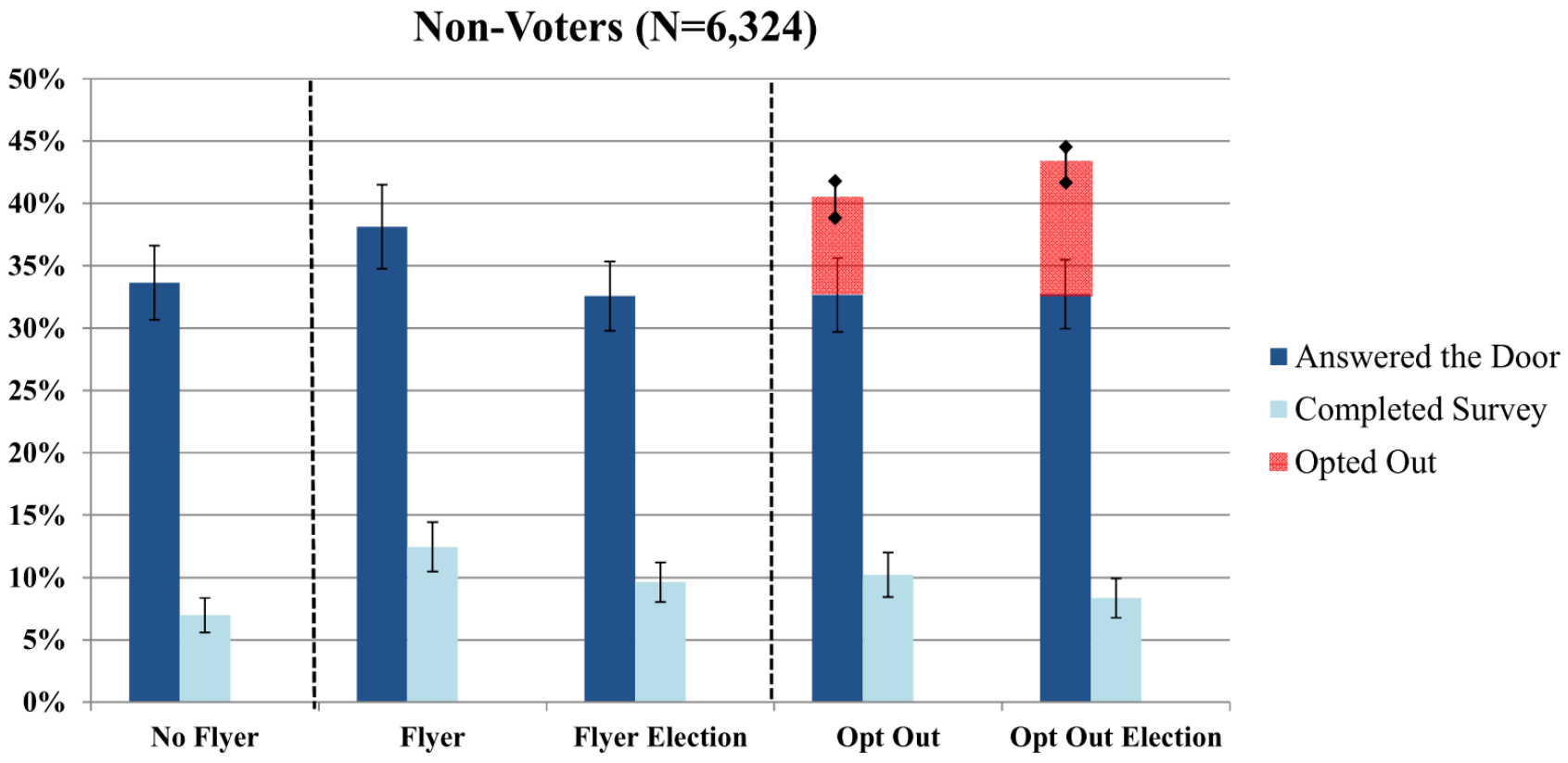
- **Sorting in Response to Election Survey -- Voters**
- Voters -> No evidence of sorting in, some evidence of sorting
- No evidence of pride in voting on average



- **Sorting in Response to Election Survey -- Voters**
- However, 2010 election was low point for democratic voters
- 2/3 of registered voters in towns we reached are Democrats
- What if we split by voting record in primaries?
- Evidence of sorting in for Republicans



- **Sorting in Response to Election Survey – Non-Voters**
- Non-voters-> Strong evidence of sorting out
- Evidence of stigma from not voting and lying costs



Exp 2: Varying payment and length of svy

THE UNIVERSITY OF
CHICAGO

University of Chicago Study

Researchers will visit this address tomorrow (/) between and to conduct a **5 minute survey.**

THE UNIVERSITY OF
CHICAGO

University of Chicago Study

Researchers will visit this address tomorrow (/) between and to conduct a **10 minute survey**.

You will be paid **$10 in cash** for your participation.

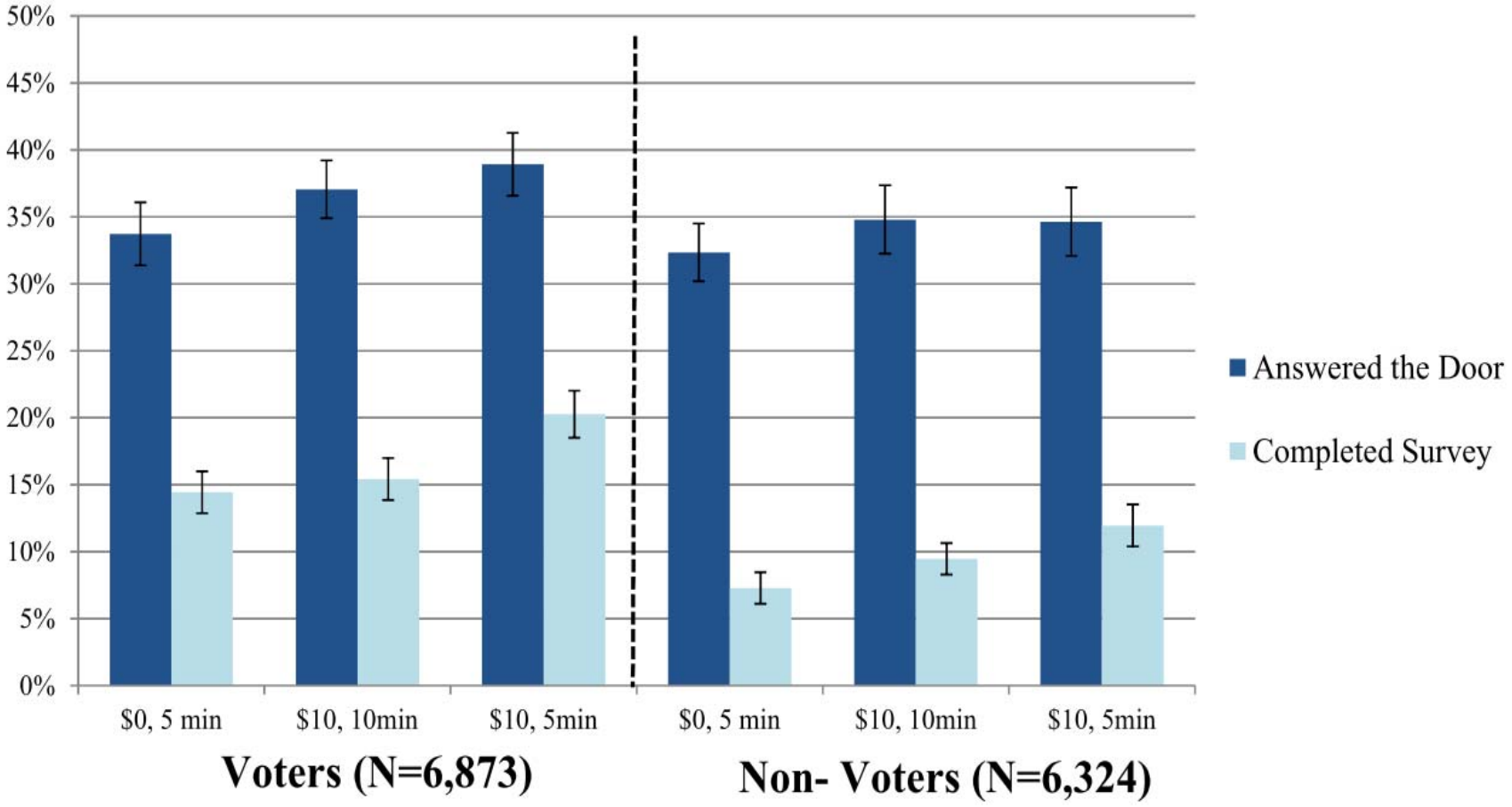
THE UNIVERSITY OF
CHICAGO

University of Chicago Study

Researchers will visit this address tomorrow (/) between and to conduct a **5 minute survey**.

You will be paid **$10 in cash** for your participation.

- **Response to Incentives**
- Response to payment and duration
- Election warning effect on non-voters ~ **$10** decrease in pay



Exp. 3: Lying Incentives

- Crossed treatment: Incentive to lie in 10-minute survey
- *No Incentive.* Just ask whether voted in 2010 election
- *8-Minute Incentive.* (8 minute incentive to say 'did not vote')
  - "**We have 10 minutes of questions about your voter participation in the 2010 congressional election, but if you say that you did not vote then we only have 2 minutes of questions. Either way you answer you will be paid $10.** [Show the end of the survey if answer to #2 is NO]

    Did you vote in the 2010 congressional election?"

  - For voters it is incentive to lie
  - For non-voters this is incentive to tell truth

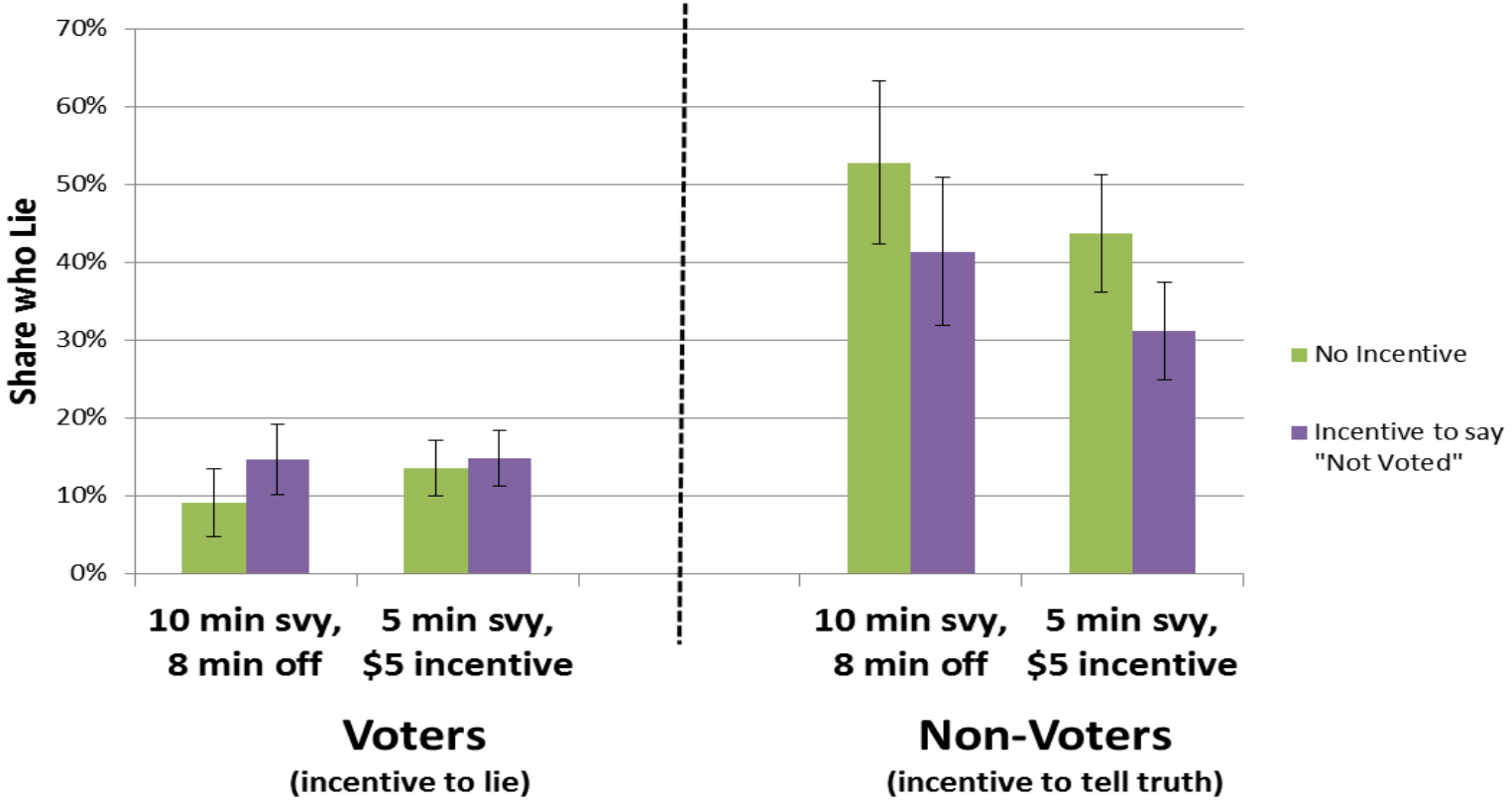
  - Novel survey instrument → Use to estimate *counterfactual* utility

Lying Incentives

- In 5-minute surveys:
- *No Incentive.* Just ask whether voted in 2010 election
- *$5 Incentive.* (<u>$5 incentive to say did not vote</u>)
  - "**We have 5 minutes of questions about your participation in the 2010 congressional election, but if you say that you did not vote then we would like to ask you an extra 1 minute of questions and we will pay you an extra $5 for answering these additional questions** [***IF PAID***: for a total of $15]**. If you say that you voted then we will just ask you the original 5 minutes of questions.** [***IF PAID*:** Either way you answer you will be paid $10.]
    Did you vote in the 2010 congressional election?"

  - Incentive to lie for voters, to tell the truth for non-voters

- **Response to Incentives to Say 'Did Not Vote'**
- Small impact on voters: 2 percentage points increase in lying → Strong social image utility and/or lying cost
- Sizeable impact on non-voters: 12 percentage point decrease in lying → Non-voters are closer to indifference



Structural Estimation

- **Structural estimates (Minimum-distance estimator)**

- Minimize distance between predicted moments $m(\vartheta)$ and observed ones $\hat{m}$

$$\min_{\vartheta} (m(\vartheta) - \hat{m})' W (m(\vartheta) - \hat{m})$$

- Moments $m(\vartheta)$:
  1. Probability of opening door to surveyor $(P(H)_j^S)$
  2. Probability of filling survey $(P(S)_j^S)$
  3. Probability of checking the opt-out box
  4. Probability of lying about voting

- All moments $\hat{P}$ are probabilities, straight from Figures

Election Field Experiment - Estimation

- What is ϑ?

- Main parameters
  - mean and s.d. of s_i^V – signalling utility of saying one voted
  - mean and s.d. of s_i^N – signalling utility of saying one did not vote
  - $L_i \geq 0$ – lying cost

- Auxiliary parameters:
  - Willingness to do survey
  - Value of time
  - Cost of avoiding suveyor

Estimation with Selection

- Estimation approach: Incorporate selection into V/NV

- Parameters (sV, sN) *predict* becoming voter or non-voter

$$pV + g - c + N\left[\max\left(s_V, s_N - L\right) - \max\left(s_N, s_V - L\right)\right] \geq 0$$

$$= \varepsilon$$

  - Assume epsilon Normal
  - Voters and non-voters drawn from same population
  - Draw parameters, determine selection into voters or non-voters
  - Match to moments using simulations
  - Assume number of times asked N from survey
  - Additional moment: baseline turnout rate (60 percent)

- Total value of voting depends on *N*
- Survey: *How often have you been asked whether you voted?*
  - *9 times* for 2008 presidential election

Estimation with Selection

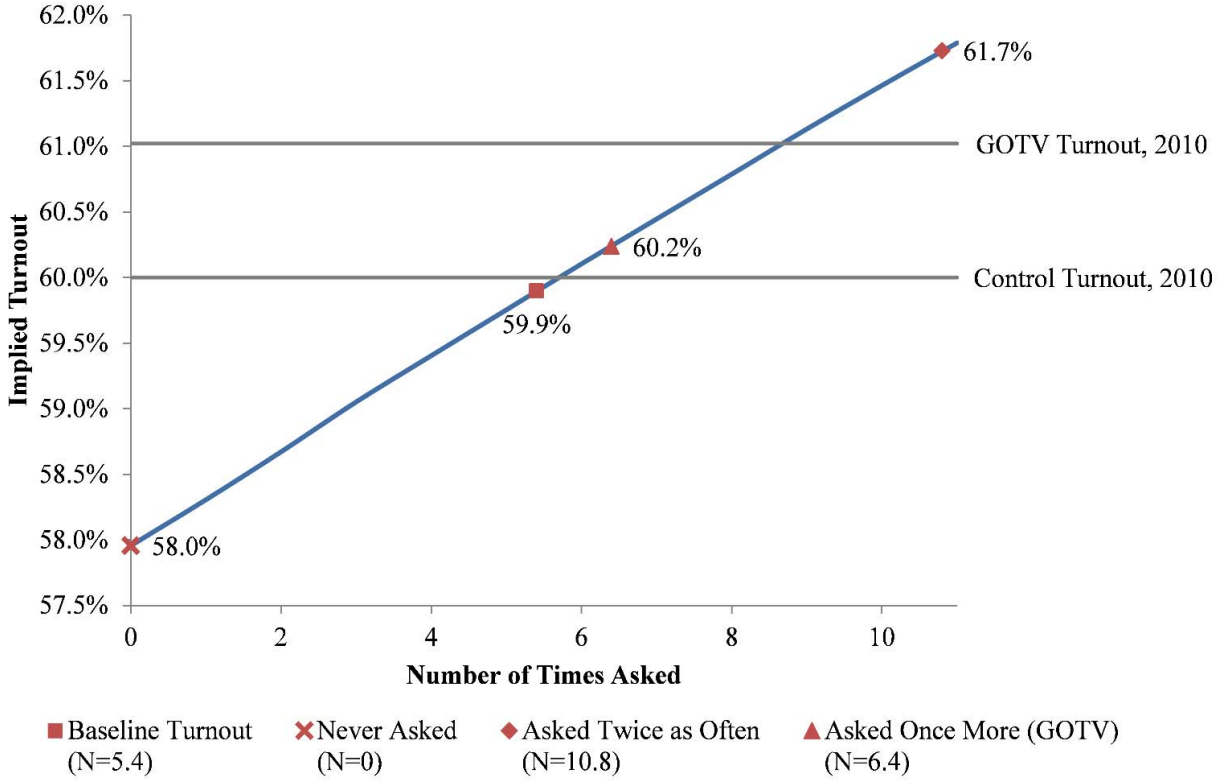
Table 3. Simulated Minimum-Distance Estimates, Benchmark Results

	Voters and Non-Voters Have Same Auxiliary Parameters	Voters and Non-Voters Have Different Auxiliary Parameters
Voting Parameters		
Mean Social Image Value of Saying Voted (s_V)	-6.3	-3.9
	(2.07)	(1.47)
Mean Social Image Value of Saying Did Not Vote (s_N)	-21.7	-11.3
	(3.19)	(1.77)
Std. Dev. of s_V and s_N	19.7	9.5
	(2.83)	(1.29)
Lying Cost L (in $)	16.4	7.6
	(2.82)	(1.21)
Mean Value of Other Reasons to Vote (ε)	95.0	64.1
	(114.33)	(167.90)
Std. Dev. of Other Reasons to Vote (ε)	490.6	318.7
	(454.75)	(691.37)

- Lying cost L estimated

Estimation with Selection

- Implications: estimate impact on voting if
  - No one asked
  - Twice as many people asked
  - Also impact of being asked one more time (next)



Estimation with Selection

- Other implications of estimates

Table 4. Implied Value of Voting and Welfare Effects of GOTV

	Voters and Non-Voters Have Same Auxiliary Parameters		Voters and Non-Voters Have Different Auxiliary Parameters	
Implications for Value of Voting to Tell Others	Voter	Non-Voter	Voter	Non-Voter
Implied Value of Voting "To Tell Others" (N=5.4)	41.4	26.1	18.3	13.3
	(5.6)	(10.2)	(4.6)	(3.3)
Baseline Turnout	0.604		0.599	
	(0.011)		(0.011)	
Implied Change in Turnout if Never Asked About Voting	-0.027		-0.019	
	(0.0153)		(0.0031)	
Implied Change in Turnout if Asked About Voting Twice as Often	+0.025		+0.018	
	(0.0081)		(0.0079)	
Implications for GOTV	Voter	Non-Voter	Voter	Non-Voter
Utility from being Asked about Voting Once	-3.7	-10.6	-2.8	-5.9
	(1.6)	(2.6)	(1.2)	(1.5)
Implied GOTV Effect (N+1)	+0.005		+0.003	
	(0.0007)		(0.0005)	
Implied Number of GOTV Subjects to Get One Additional Vote (N+1)	206		295	
	(69.5)		(84.9)	
Disutility Cost of Getting One Additional Vote (N+1)	-1326		-1189	
	(449.6)		(2684.4)	

Prospective Election Field Experiment

- If estimates are correct, being asked one more time increases the value of voting by $1.50-$3.00

- Experiment in week before elections in 2010 and 2012
  - Control (C) group: No contact
  - Control Flyer (CF) group: Flyer reminds households to vote
  - Treatment Flyer (TF) group: Flyer reminds households to vote, AND announces that a surveyor will come by to ask whether they voted in one of the following three weeks

- Comparison of turnout rate in TF group versus CF group provides evidence on impact of social image motive on voting

Prospective Election Field Experiment

THE UNIVERSITY OF
CHICAGO

University of Chicago
Study

Don't forget to vote in the 2012 Presidential Election.

Election Day is Tuesday, November 6, 2012.

- Control Flyer

←

- Treatment Flyer

→

THE UNIVERSITY OF
CHICAGO

University of Chicago
Study

Researchers will contact you within three weeks of the election (between 11/7 and 11/27) to conduct a survey on your voter participation.

Don't forget to vote in the 2012 Presidential Election.

Election Day is Tuesday, November 6, 2012.

Prospective Election Experiment

Table 7. Results for Get-Out-The-Vote Treatments

Specification:	OLS Regressions			
Dependent Variable:	Indicator for Voting in Election in Year t			
Election:	Congressional Elections in Nov. 2010		Presidential Elections in Nov. 2012	
	(1)	(2)	(3)	(4)
Constant	0.6000***		0.7312***	
	(0.0109)		(0.0033)	
Flyer with Voting Reminder	-0.0020	-0.0031	0.0060	0.0046
	(0.0152)	(0.0083)	(0.0056)	(0.0034)
Flyer with Announcement Will Ask About Voting	0.0120	0.0102	0.0023	0.0056
	(0.0157)	(0.0084)	(0.0056)	(0.0034)
Omitted Treatment	No Flyer		No Flyer	
Control for past Voting since 2004		X		X
Difference (Flyer Will Ask - Flyer Reminder)	0.0140	0.0133	-0.0037	0.0010
p-value for test of equality, 2-sided	p=0.365	p=0.120	p=0.561	p=0.811
p-value for test of equality, 1-sided	p=0.182	p=0.060*		p=0.405
R2	0.0001	0.4024	0.0000	0.3251
N	N = 31,306	N = 31,304	N = 93,805	N = 93,805

- 1.3pp. effect in 2010 (marg. Significant 1-sided)
- 0.1pp. Effect in 2012 (highly competitive election)
- Estimates consistent with predicted small effect from model

Section 6

Next Lecture

Next Lecture

- Structural Behavioral Economics
- Behavioral Finance
- Behavioral Labor
- Behavioral Institutional Design