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

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Outline

1. Market Reaction to Biases: Pricing
2. Market Reaction to Biases: Corporate Decisions
3. Market Reaction to Biases: Employers
4. Market Reaction to Biases: Political Economy
5. Welfare Response to Biases
6. Summary of Evidence
7. Concluding Remarks

1 Market Reaction to Biases: Pricing

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

- Firms are aware of bounded rationality of consumers
  $\longrightarrow$ design products & prices to take advantage of bounded rationality of consumers

Three steps:

1. Given product complexity, given number of firms: What is the mark-up? Comparative statics.

2. Given product complexity: endogenous market entry. What is the mark-up? What is the number of firms?

3. Endogenous product complexity, endogenous market entry: What are mark-up, number of firms, and degree of product complexity?

We will go through 1, skip 2, and talk about the intuition of 3.

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
- bank hours
- ATM locations
- web-based banking services
- linked products (e.g. investment services)

Given such complexity, consumers do not know the exact value of products they buy.

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.

    (Suppress consumer-specific subscript a; $U_i \equiv U_{ia}$ and $\varepsilon_i \equiv \varepsilon_{ia}$.)

- Consumer decision rule: Picks the one good with highest signal U_i from $(U_i)_{i=1}^n$.
  (**Assumption!** What justifies this assumption?) Demand for good i

$$\begin{aligned} D_i &= P\left(U_i > \max_{j \neq i} U_j\right) \\ &= E\left[P\left[\text{for all } j \neq i, U_i > U_j | \varepsilon_i\right]\right] \\ &= E\left[\prod_{j \neq i} P\left[U_i > U_j | \varepsilon_i\right]\right] \\ &= E\left[\prod_{j \neq i} P\left[\frac{Q_i - p_i - \left(Q_j - p_j\right) + \sigma_i \varepsilon_i}{\sigma_j} > \varepsilon_j | \varepsilon_i\right]\right] \end{aligned}$$

$$D_i = \int f(\varepsilon_i) \prod_{j \neq i} F\left(\frac{Q_i - p_i - \left(Q_j - p_j\right) + \sigma_i \varepsilon_i}{\sigma_j}\right) d\varepsilon_i$$

Market equilibrium with exogenous complexity

Bertrand competition with

- Q_i : quality of a good,

  σ_i : complexity of a good,

  c_i : production cost

  p_i : price

- Simplification: Q_i, σ_i, c_i identical across firms. (*Problem: How should consumers choose if all goods are known to be identical?*)

- Firms maximize profit $\pi_i = (p_i - c_i) D_i$

- Symmetry reduces demand to

$$D_i = \int f(\varepsilon_i) F\left(\frac{p_j - p_i + \sigma\varepsilon_i}{\sigma}\right)^{n-1} d\varepsilon_i$$

Example of demand curves

Gaussian noise $\varepsilon \sim N(0,1)$, 2 firms

Demand curve faced by firm 1:

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

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 –> For $\sigma \to \infty$

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

Set $\sigma \to \infty$ and obtain infinite profits by letting $p_1 \to \infty$

(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

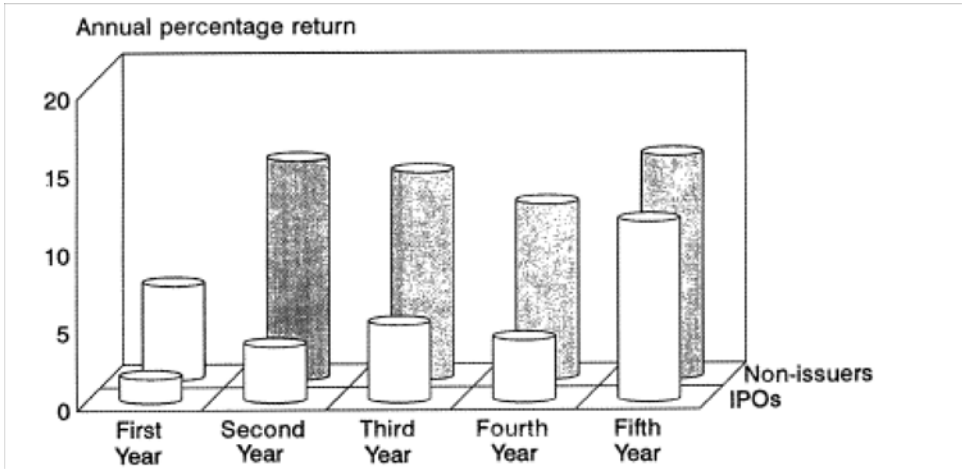
2 Market Reaction to Biases: Corporate Decisions

- **Baker, Ruback, and Wurgler (2005)**
- Behavioral corporate finance:
  - biased investors (overvalue or undervalue company)
  - smart managers
- (Converse: biased (overconfident) managers and rational investors)
- Firm has to decide how to finance investment project:
  1. internal funds (cash flow/retained earnings)
  2. bonds
  3. stocks

- Fluctuation of equity prices due to noise traders
- Managers believe that the market is inefficient
  - Issue equity when stock price exceeds perceived fundamental value
  - Delay equity issue when stock price below perceived fundamental value
- Consistent with
  - Survey Evidence of 392 CFO's (Graham and Harvey 2001): 67% say under/overvaluation is a factor in issuance decision
  - Insider trading
- Go over quickly two examples

Long-run performance of equity issuers

- Market Timing prediction: Companies issuing equity underperform later
- Loughran-Ritter (1995): Compare matching samples of
  - companies doing IPOs
  - companies not doing IPOs but have similar market cap.



- Similar finding with SEOs

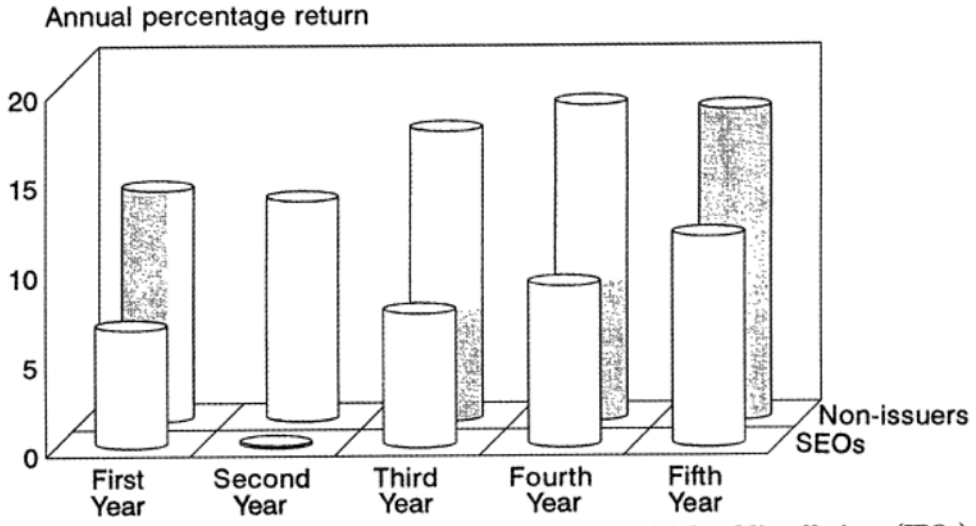
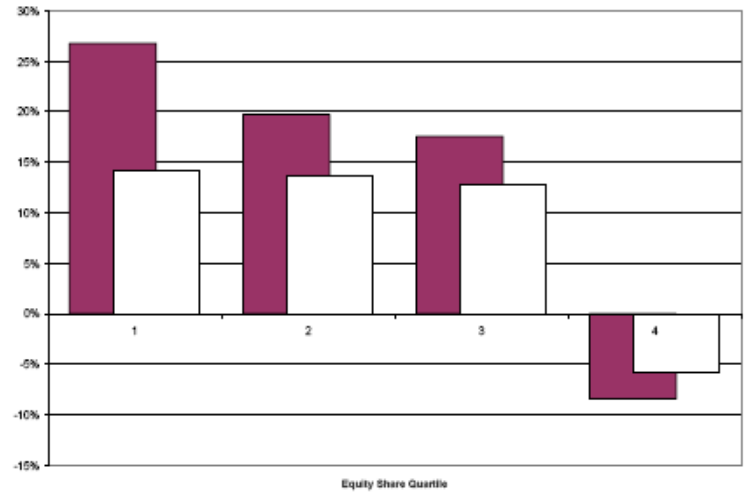


Figure 2. The average annual raw returns for 4,753 initial public offerings (IPOs), and their matching nonissuing firms (top), and the average annual raw returns for 3,702 seasoned equity offerings (SEOs), and their matching nonissuing firms (bottom), during the five years after the issue. The equity issues are from 1970 to 1990. Using the first closing postissue market price, the equally weighted average buy-and-hold return for the year after the issue is calculated for the issuing firms and for their matching firms (firms with the same market capitalization that have not issued equity during the prior five years). On each anniversary of the issue date, the equally weighted average buy-and-hold return during the next year for all of the surviving issuers and their matching firms is calculated. For matching firms that get delisted (or issue equity) while the issuer is still trading, the proceeds from the sale on the delisting date are reinvested in a new matching firm for the remainder of that year (or until the issuer is delisted). The numbers graphed above are reported in Table III.

- Baker-Wurgler (1998): Continuous measure of equity share in new issues
- (If company issues debt, it is not sign of mispricing)
- Similar strong finding of predictability of later returns

Figure 2. Mean equity returns by prior-year equity share in new issues, 1928-1997. Mean annual real returns on the CRSP value-weighted (hatched) and equal-weighted (solid) indexes by quartile of the prior-year share of equity issues in total equity and debt issues. Real returns are created using the consumer price index from *SBBI*.



- Market Timing of Managerial Decision first-order phenomenon

3 Market Reaction to Biases: Employers

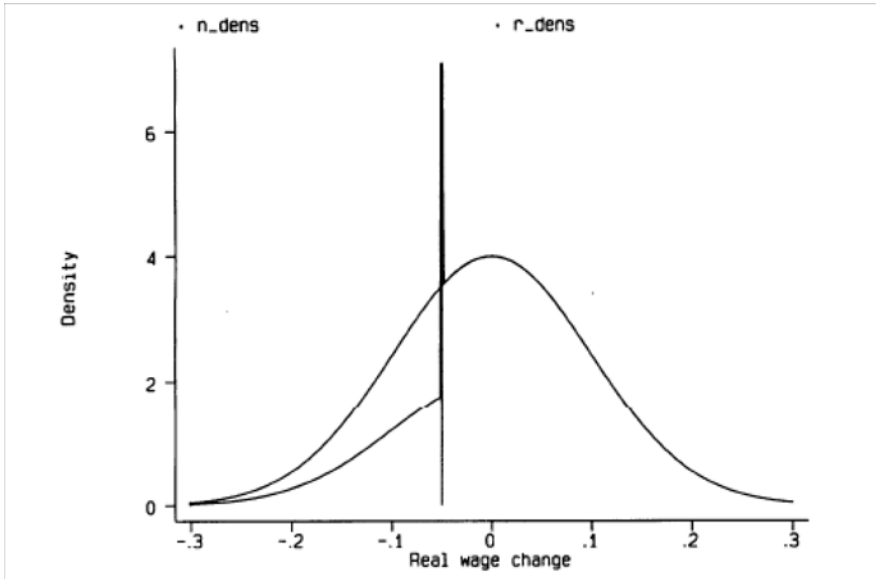
- Employee dislike for nominal wage cuts
- **Kahneman, Knetsch and Thaler (1986)**: Telephone surveys in Canada in 1984 and 1985 –> Ask questions on fairness

Question 4A. A company is making a small profit. It is located in a community experiencing a recession with substantial unemployment but no inflation. There are many workers anxious to work at the company. The company decides to decrease wages and salaries 7% this year.
($N = 125$) Acceptable 38% Unfair 62%

Question 4B. ...with substantial unemployment and inflation of 12%...The company decides to increase salaries only 5% this year.
($N = 129$) Acceptable 78% Unfair 22%

- A real and nominal wage cut is not fair (Question 4A)
- A real (but not nominal) wage cut is fair (Question 4B)

- If this is true, expect employers to minimize cases of $w_t - w_{t-1} < 0$
- **Card and Hyslop, 1997**: Examine discontinuity around 0 of nominal wage changes
- Prediction of theory:



- Data sources:
  - 1979-1993 CPS.
    - Rolling 2-year panel
    - Restrict to paid by the hour and to same 2-digit industry in the two years
    - Restrict to non-minimum wage workers
  - PSID 4-year panels 1976-79 and 1985-88
- Use Log Wage changes: $\log w_t - \log w_{t-1}$
- Issue with measurement error and heaping at $\log w_t - \log w_{t-1} = 0$
- Construct counterfactual density of LogWage changes
  - Assume symmetry
  - Positive log wage changes would not be affected

- Plots using kernel estimates of density (local smoother)
- Compare the actual distribution and the predicted one
- Evidence from the CPS year-by-year
- Problem more severe in years with lower inflation

- Large effect of nominal rigidities
- Effect on firings?

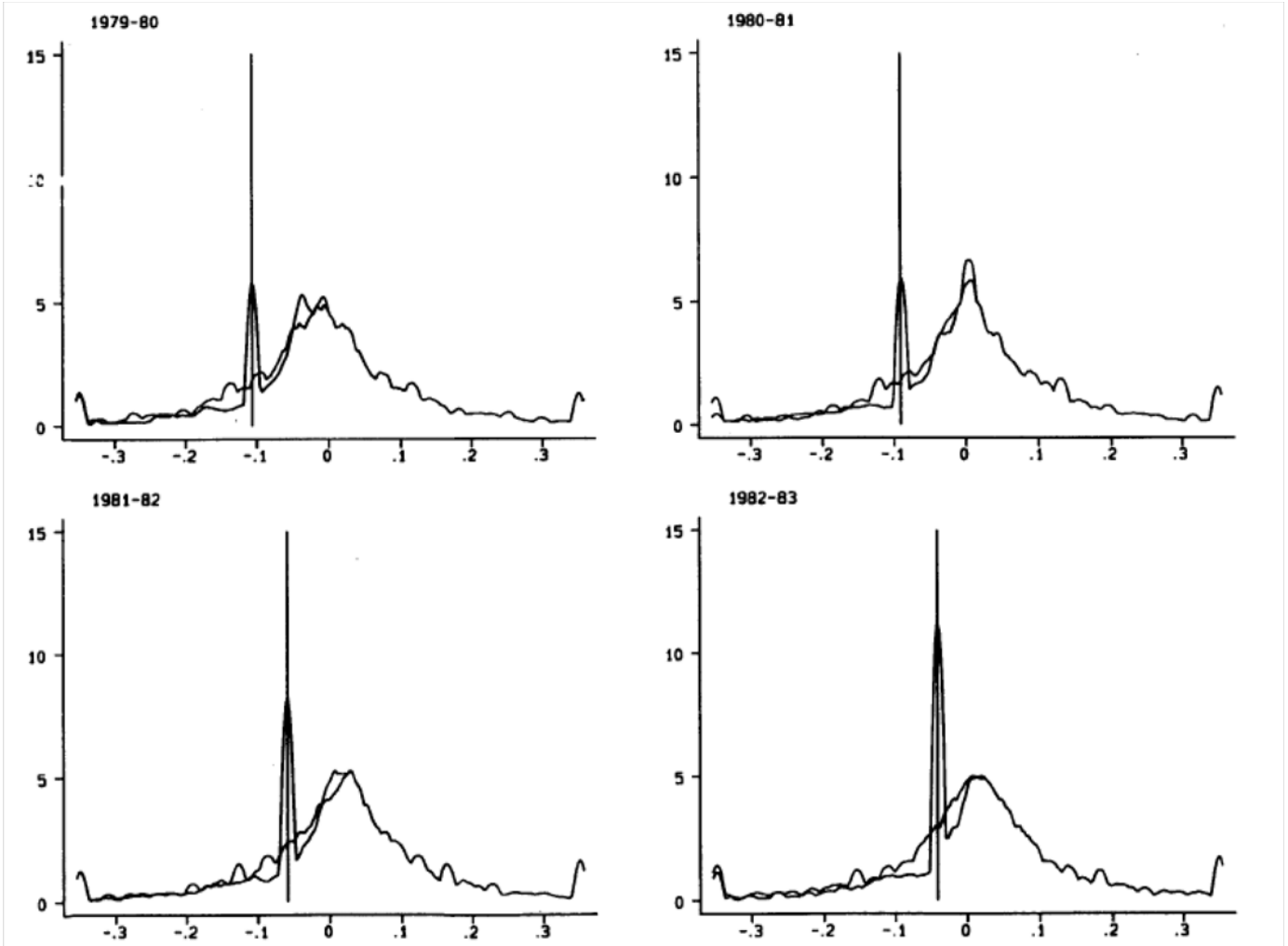


Figure 4: Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1979-80 to 1982-83

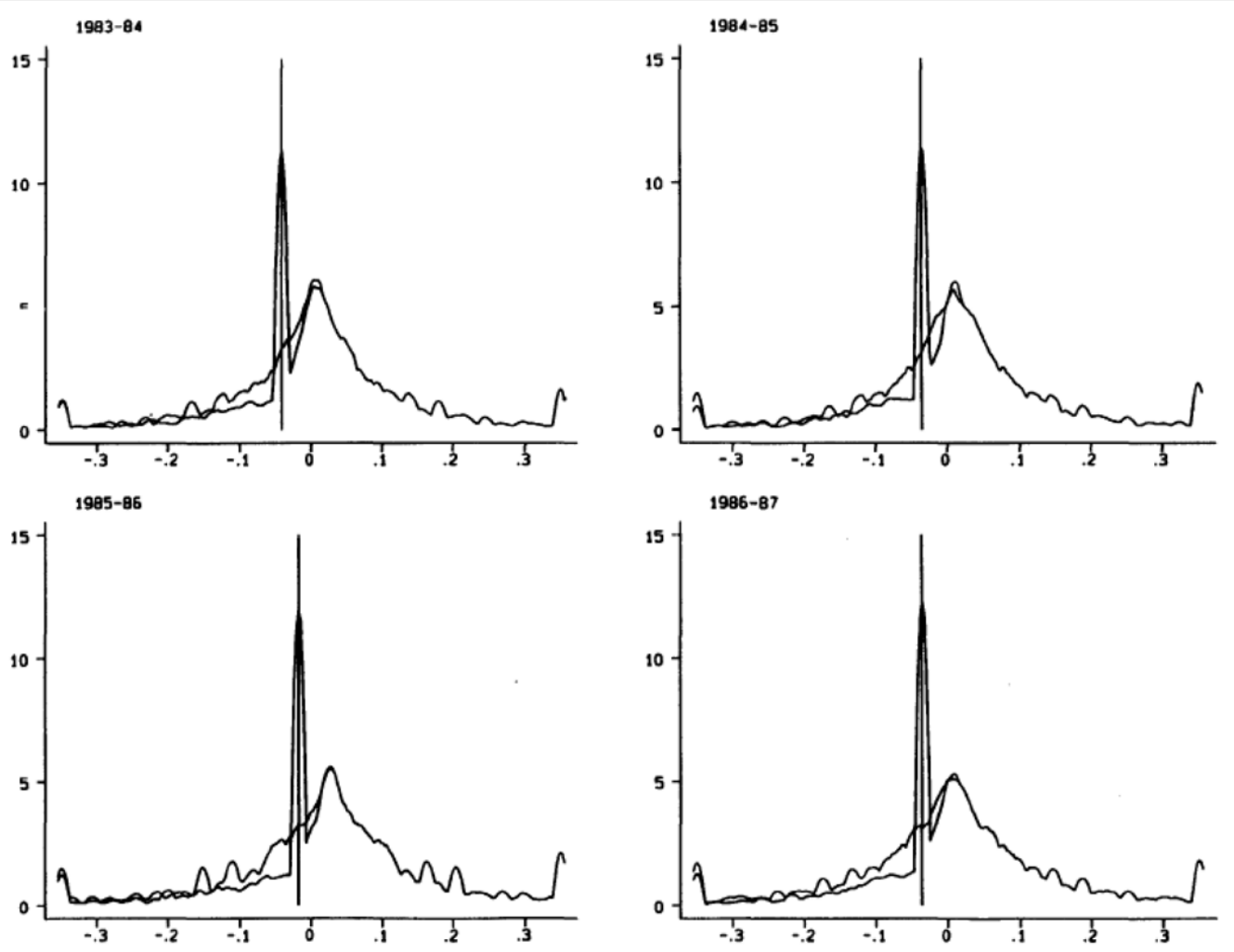


Figure 4 (Continued): Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1983-84 to 1986-87

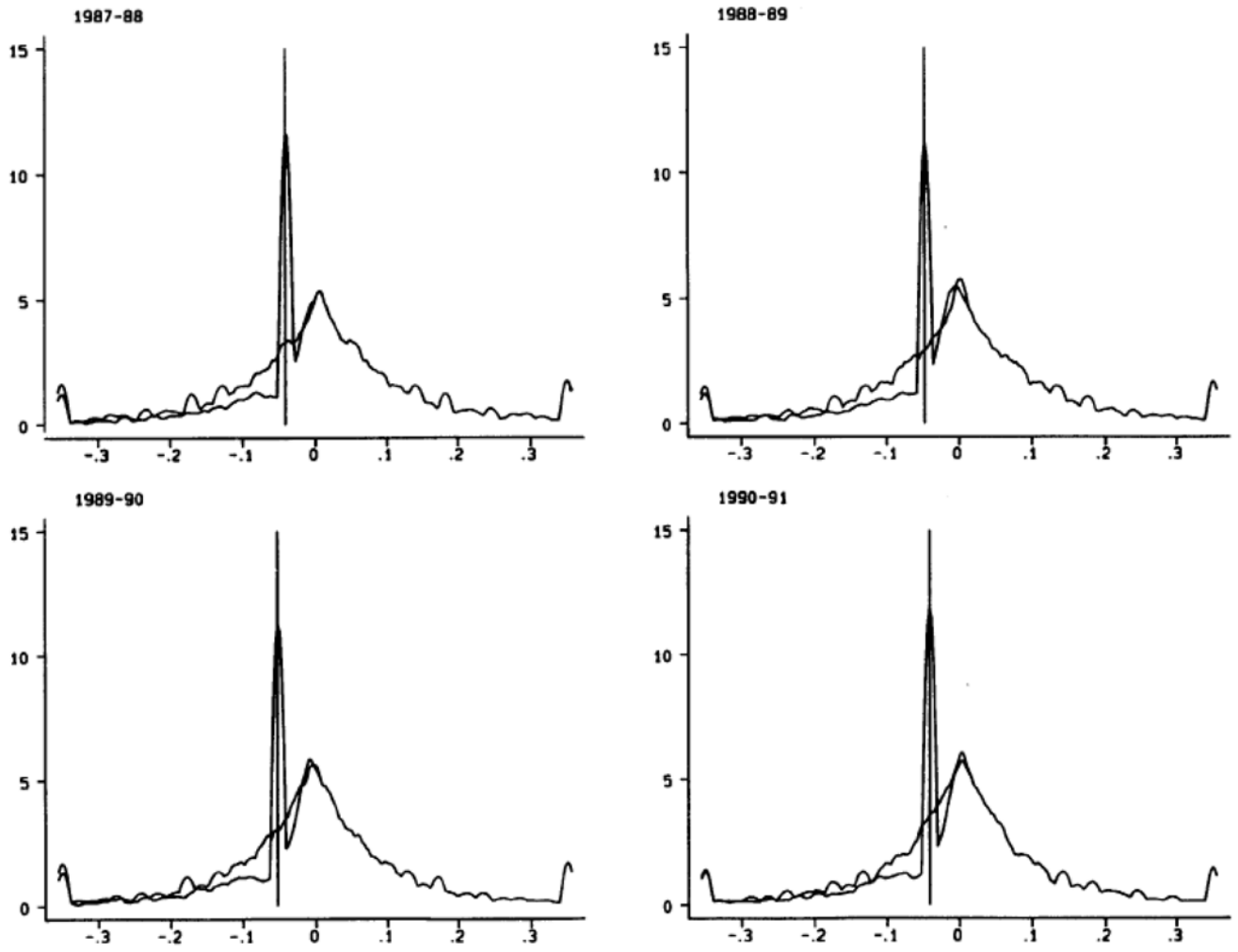


Figure 4 (Continued): Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1987-88 to 1990-91

4 Market Reaction to Biases: Political Economy

- 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**

- Examples of voter biases:
  - Effect of candidate order (Ho and Imai)
  - Imperfect signal extraction (Wolfers, 2004) –> Voters more likely to vote an incumbent if the local economy does well even if... it's just due to changes in oil prices
  - Susceptible to persuasion (DellaVigna and Kaplan, 2007)
  - More? Short memory about past performance?
- **Eisensee and Stromberg (2007)**: Limited attention of voters

- 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

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

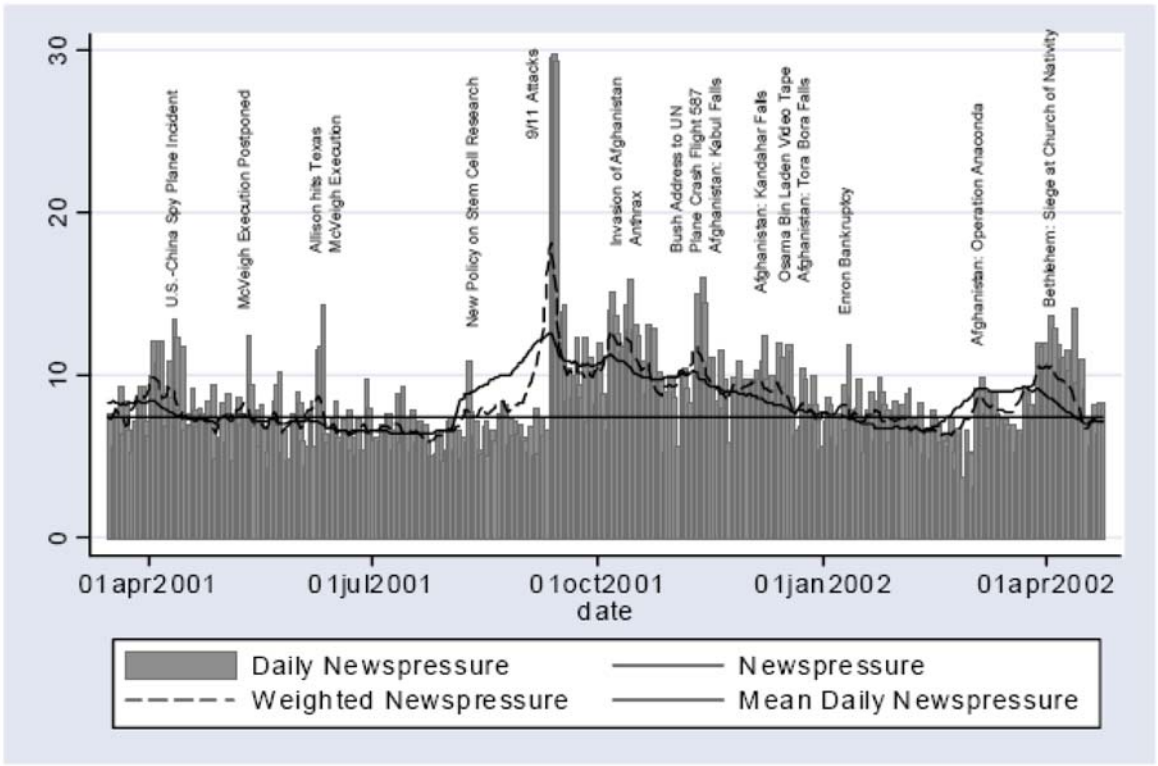


FIGURE IV
News Pressure (Minutes) during 405 Days, 15 March 2001 – 23 Apr 2002, by Day

- 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*

- 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

$$\text{Re}\,lief = \alpha News + \beta X + \varepsilon$$

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

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%.

- First-Stage: 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)

- Is there a spurious correlation between instruments and type of disaster?
- No correlation with severity of disaster

TABLE V

CORRELATIONS BETWEEN INSTRUMENTS AND THE SEVERITY OF DISASTERS

	Dependent variable	
	News Pressure	*Olympics*
log Killed	-0.0082	0.0003
	(0.0113)	(0.0010)
log *Affected*	0.0005	-0.0006
	(0.0068)	(0.0006)
p-value: F-test of joint insignificance	0.75	0.62
Observations	5212	5212
R-squared	0.3110	0.2035

OLS regressions with the instruments *News Pressure* and *Olympics* as dependent variables, and including year, month, country and disaster type fixed effects. Robust standard errors in parentheses:* significant at 10%; ** significant at 5%; *** significant at 1%. The F-test tests the joint significance of log *Killed* and log *Affected* in the regression.

- OLS and IV Regressions of Reliefs on presence in the News
- (Instrumented) availability in the news at the margin has huge effect: Almost one-on-one effect of being in the news on aid

TABLE VI
DEPENDENT VARIABLE: *Relief*

	OLS					IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
News	0.2886	0.158	0.1309	0.2323	0.2611	0.8237	0.6341	0.6769
	(0.0200)***	(0.0232)***	(0.0178)***	(0.0328)***	(0.0569)***	(0.2528)***	(0.3341)*	(0.2554)***
News*abs(Pr(news)-0.5)				-0.4922	-0.302			
				(0.1059)***	(0.0840)***			
abs(Pr(news)-0.5)				0.5374	0.2959			
				(0.0943)***	(0.0831)***			
log Killed		0.0486					0.0198	
		(0.0046)***					-0.0208	
log Affected		0.0358					0.0299	
		(0.0024)***					(0.0048)***	
imputed log Killed			0.0378	0.0546	0.0307			0.0109
			(0.0038)***	(0.0049)***	(0.0046)***			-0.0132
imputed log Affected			0.0375	0.0445	0.0345			0.0292
			(0.0020)***	(0.0023)***	(0.0026)***			(0.0045)***
F-stat, instruments, 1st stage						11.0	6.1	11.1
Over-id restrictions, χ^2_{df} (p-value)						0.51_1(0.47)		0.64_1 (0.42)
Observations	5212	2926	5212	5212	5027	5212	2926	5212
R-squared	0.2443	0.4225	0.3800	0.3860				

All regressions include year, month, country, and disaster type fixed effects. Regressions with imputed values ((3), (4) and (5)) 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%.

- Second example: Theory/History paper, **Glaeser (2005)** on Political Economy of Hatred

- Idea: Hatred has demand side and supply side
  - Demand side:
    - Voters are susceptible to hatred (experiments: ultimatum game)
    - Media can mediate hatred
  - Supply side:
    - Politicians maximize chances of reelection
    - Set up a hatred media campaign toward a group for electoral gain
    - In particular, may target non-median voter

- Idea:
  - Group hatred can occur, but does not tend to occur naturally
  - Group hatred can be due to political incentives
  - Example 1: *African Americans in South, 1865-1970*
    - No hatred before Civil War
    - Conservative politicians foment it to lower demand for redistribution
    - Diffuse stories of violence by Blacks
  - Example 2: *Hatred of Jews in Europe, 1930s*
    - No hatred before 1920
    - Jews disproportionately left-wing
    - Right-wing Hitler made up Protocol of Elders of Zion

5 Welfare Response to Biases

- Need for government/social planner intervention?
  - No if:
    - Sophistication about biases
    - Markets to correct biases exist
  - Potentially yes if:
    - Naivete' of agents
    - Missing markets
    - Example: sin taxes on goods
- Government intervention does not need to be heavy-handed:
  - Require active decision
  - Change default

- Benartzi-Thaler, 2004 (First Behavioral paper in JPE for 15 since 1991!)
- Setting:
  - Midsize manufacturing company
  - 1998 onward
  - Company constrained by anti-discrimination rules —> Interested in increasing savings
- Features of SMT 401(k) plan:
  - No current increase in contribution rate
  - Increase in contribution rate by 3% per future pay increase
  - Can quit plan at any time

- Biases targeted:
  1. Self-control
     - Desire to Save more
     - Demand for commitment
  2. Partial naivete'
     - Partial Sophistication –> Demand of commitment
     - Partial Naiveté –> Procrastination in quitting plan
  3. Loss Aversion with respect to nominal wage cuts
     - Hate real wage cuts
     - Accept nominal wage cuts

- Solutions:
  1. Increase savings in the future (not in present)
  2. Set default so that procrastination leads to **more** (not less) savings
  3. Schedule increase only at time of pay raise
- Implementation:

TABLE 1
PARTICIPATION DATA FOR THE FIRST IMPLEMENTATION OF SMART

Number of plan participants prior to the adoption of the SMarT plan	315
Number of plan participants who elected to receive a recommendation from the consultant	286
Number of plan participants who implemented the consultant's recommended saving rate	79
Number of plan participants who were offered the SMarT plan as an alternative	207
Number of plan participants who accepted the SMarT plan	162
Number of plan participants who opted out of the SMarT plan between the first and second pay raises	3
Number of plan participants who opted out of the SMarT plan between the second and third pay raises	23
Number of plan participants who opted out of the SMarT plan between the third and fourth pay raises	6
Overall participation rate prior to the advice	64%
Overall participation rate shortly after the advice	81%

- Result 1: High demand for commitment device
- Result 2: Phenomenal effects on savings rates

TABLE 2
AVERAGE SAVING RATES (%) FOR THE FIRST IMPLEMENTATION OF SMART

	Participants Who Did Not Contact the Financial Consultant	Participants Who Accepted the Consultant's Recommended Saving Rate	Participants Who Joined the SMarT Plan	Participants Who Declined the SMarT Plan	All
Participants initially choosing each option*	29	79	162	45	315
Pre-advice	6.6	4.4	3.5	6.1	4.4
First pay raise	6.5	9.1	6.5	6.3	7.1
Second pay raise	6.8	8.9	9.4	6.2	8.6
Third pay raise	6.6	8.7	11.6	6.1	9.8
Fourth pay raise	6.2	8.8	13.6	5.9	10.6

* There is attrition from each group over time. The number of employees who remain by the time of the fourth pay raise is 229.

- Second implementation: Simple letter sent, no seminar / additional information + 2% increase per year

- Lower take-up rate (as expected), equally high increase in savings

TABLE 3
AVERAGE SAVING RATES FOR ISPAT INLAND (%)

	EMPLOYEES WHO WERE ALREADY SAVING ON MAY 31, 2001		EMPLOYEES WHO WERE NOT SAVING ON MAY 31, 2001		ALL ELIGIBLE EMPLOYEES
	Joined SMarT (N=615)	Did Not Join SMarT (N=3,197)	Joined SMarT (N=165)	Did Not Join SMarT (N=1,840)	(N=5,817)
Pre-SMarT (May 2001)	7.62	8.62	.00	.00	5.54
First pay raise (October 2001)	9.38	8.54	2.28	.26	5.83

NOTE.—The sample includes 5,817 employees who are eligible to participate in the 401(k) plan and have remained with the company from May 2001 through October 2001. The sample includes 414 employees who were already saving at the maximum rate of 18 percent, although they were not allowed to join the SMarT program. The reported saving rates represent the equally weighted average of the individual saving rates.

- Third Implementation with Randomization:
  - Division A: Invitation to attend an informational seminar (40% do)
  - Division O: 'Required' to attend information seminar (60% do)
  - 2 Control Divisions
- Two differences in design:
  - Increase in Savings take place on April 1 whether pay increase or not (April 1 is usual date for pay increase)
  - Choice of increase in contr. rate (1%, 2%, or 3%) (Default is 2%)
  - Increases capped at 10%
- Results: Sizeable demand for commitment, and large effects on savings + Some spill-over effects

TABLE 4
AVERAGE SAVING RATES (%) FOR PHILIPS ELECTRONICS

DATE	EMPLOYEES WHO WERE ALREADY SAVING IN DECEMBER 2001: Joined SMarT	EMPLOYEES WHO WERE ALREADY SAVING IN DECEMBER 2001: Did Not Join SMarT	EMPLOYEES WHO WERE NOT SAVING IN DECEMBER 2001: Joined SMarT	EMPLOYEES WHO WERE NOT SAVING IN DECEMBER 2001: Did Not Join SMarT	ALL EMPLOYEES
	A. Control Group				
Observations		7,405		7,053	14,458
Pre-SMarT (December 2001)		5.65		.00	2.90
Post-SMarT (March 2002)		5.76		.70	3.29
	B. Test Group (Divisions A and O Combined)				
Observations	180	339	36	260	815
Pre-SMarT (December 2001)	5.26	5.38	.00	.00	3.40
Post-SMarT (March 2002)	6.83	5.72	5.03	1.55	4.61
	C. Division A				
Observations	66	190	10	163	449
Pre-SMarT (December 2001)	5.47	5.48	.00	.00	3.12
Post-SMarT (March 2002)	7.32	5.97	6.80	1.54	4.38
	D. Division O				
Observations	114	149	26	77	366
Pre-SMarT (December 2001)	5.14	5.25	.00	.00	3.74
Post-SMarT (March 2002)	6.55	5.41	4.35	1.58	4.89

NOTE.—The "test" group consists of individuals at Divisions A and O.

- Issues:
  - Saving too much? Ask people if would like to quit plan

TABLE 6
MEDIAN INCOME REPLACEMENT RATIOS (%)

	AGE			
INCOME	25	35	45	55
	A. Pre-SMarT			
$25,000	57	57	56	55
$50,000	51	51	51	54
$75,000	48	49	46	43
	B. Post-SMarT			
$25,000	108	90	75	63
$50,000	98	83	70	62
$75,000	90	77	63	50

NOTE.—The table displays the median income replacement ratios for different age and income profiles, using investment advice software by Financial Engines. The projections are based on the following assumptions: no defined-benefit pension, statutory social security benefits, employee saving rate of 4 percent before SMarT and 14 percent thereafter, employer match of 50 cents on the dollar up to 6 percent, portfolio mix of 60 percent stocks and 40 percent bonds, and retirement age of 65.

-
  - General equilibrium effect of increase in savings on returns
  - Why didn't a company offer it?
  - How about teaching people?

- Psychology & Economics & Public Policy:
  - Leverage biases to help biased agents
  - Do not hurt unbiased agents (cautious paternalism)
- SMartT Plan is great example:
  - From Design of an economist...
  - ...to Research Implementation with Natural Experiment and Field Experiment
  - ...to Policy Implementation into Law passed in Congress: *Automatic Savings and Pension Protection Act*

- Research agenda:
  - Identify biases (persuasion? reference dependence? self-control?)
  - Design contract/institution
  - Field experiment
  - Good luck!

6 Summary of Evidence

- Update type of evidence encountered so far
- Empirical evidence of type 1 (DellaVigna and Malmendier, 2004; Miravete, 2004; Odean, 1999; Sydnor, 2004; Souleles, 2004):

1. - **Menu choice.** Need to observe:
   (a) menu of options
   (b) later utilization
   - Use revealed preferences to make inferences from contract choice in (a)
   - Compare to actual utilization in (b)
   - Worries: hard to distinguish unusual preferences (self-control) and wrong beliefs (naiveté, overconfidence)

- Simple example.
  - Agent can choose action X_1 or X_2
  - Upon choice of X_i, agent chooses x_i
- Prediction of standard theory:

$$\text{If Choose } X_1\text{, then } Eg\left(x_1\right) \geq \bar{g}$$

- Consider consumers choosing X_1
- Choice of x_1 conditional on X_1 –> Estimate $Eg\left(x_1\right)$
- Then, reject standard theory if

$$Eg\left(x_1\right) < \bar{g} \text{ among those choosing } X_1$$

- DellaVigna and Malmendier (2006) on health clubs
- Choice of
  - Monthly contract (X_M), lump-sum fee $L =$ \$80
  - Pay-per-visit (X_P) at $p =$ \$10
- Observe number of visits v_i, upon choice of X_i.
- Prediction of standard theory:

$$\text{If Choose } X_M, \text{ then } E_M[v] \geq L/p$$

- (This is "if" statement, "only if" part does not hold)
- Use data to estimate $E_M[v]$ and conclude

$$E_M[v] < L/p$$

  –> Rejection of standard theory

- Empirical evidence of types 2 and 3 share same idea, with different identification strategies
- Observe two situations, treatment situation T and control situation C
- Observe outcome x_i $(i = T, C)$
- Comparative statics prediction of different models:
  - Standard model:

$$Ex_T \leq Ex_C$$

  - Alternative model:

$$Ex_T > Ex_C$$

- Compare empirically Ex_T and Ex_C to test standard vs. alternative model

- Empirical evidence of type 2 (Benartzi and Thaler, 2004; Choi et al.:, 2001; Huberman and Regev, 2001; Madrian and Shea, 1999; Wolfers and Zitzewtiz, 2003):

1. - **Natural Experiments**
   - At time t, change in regime
   - Simple difference: Look at (After t - Before t)
   - Double Difference: Look at (After t - Before $t)_{Treatment}$ - (After t - Before $t)_{Control}$
   - Worries:

   (a) Endogeneity of change

   (b) Other changes occurring at same time

   (c) How many observations? Maybe $n = 1$?

- Empirical evidence of type 3 (Ariely and Wertenbroch, 2002; Ausubel, 2004; Duflo and Saez, 2003; Falk and Ichino, 2004; Fehr and Goette, 2004; Hossain and Morgan, 2003; List's work):

1. - **Field experiments**
   (a) Naturalistic setting
   (b) Explicitly Randomize treatment
   - Plus: Randomization ensures clean identification
   - Plus: Inference takes place in the field
   - Minus: Costly to run –> Sample usually small

- Empirical evidence of type 4 (Barber and Odean, 2004; Camerer et al., 2001; DeGeorge et al., 1999; Farber, 2004; Genesove and Mayer, 2003; Malmendier and Tate, 2004; Odean, 1998):

1. - **Correlational studies**

   (a) Variables x and y. Standard theory predicts

   $$Cov\,(x, y) \geq 0$$

   (b) Behavioral theory predicts

   $$Cov\,(x, y) < 0.$$

   - Most commonly available evidence
   - Minus: Hard to infer causality
   - Minus: Hard unless theory makes sign prediction on correlation

- Empirical evidence of type 5 (Laibson, Repetto, and Tobacman, 2006; Paserman, 2004; Fang and Silverman, 2006; Conlin, O'Donoghue, and Vogelsang, 2007):

1. - **Structural Identification**
   (a) Write down model
   (b) Test prediction based on theory
   - Minus: Often hard to know what is driving results
   - Minus: Very time-consuming
   - Plus: Can estimate underlying parameters $(\beta, \hat{\beta})$
   - Plus: Can do welfare and policy evaluations
   - Compromise: Do calibrations

7 Concluding Remarks

- How to complete a dissertation and be (approximately) happy
  1. Know yourself, and put yourself to work
     - Do you procrastinate?
     - Are you afraid of undirected research?
     - Not enough intuition?
     - Not enough technicality?
     - Work in team with a classmate!

2. Economics is about techniques, and about ideas.
   - Are second-price, affiliated combinatorial auctions not your bread?
   - Do you find it hard to derive asymptotic distribution of MSM estimators?
   - You are not alone!
   - But... anyone can have ideas (Levitt)
   - Start from new idea, not from previous papers

3. But...
   - No excuse not to know the techniques
   - Models are important to convey your ideas –> Train yourself
   - It will be much easier to learn and use them once you have an interesting problem at hand

4. What are good ideas?
   - 1% of GDP (Glaeser)
   - new questions (better) or unknown answers
   - questions you care about (comparative advantage)
   - socially important topics, if you can

5. Look for occasions to learn:
   - Attend seminars
   - Attend job market talks
   - Do not read too much literature
   - Discuss ideas with peers, over lunch, with yourself

- Get started on some data set
- Be curious

6. Above all, do not get discouraged...
   - Unproductive periods are a fact of life
   - Ideas keep getting better (and economics becomes more fun) with exercise
   - Work hard
   - Keep up the exercise!