Econ 219B
Psychology and Economics: Applications
(Lecture 14)

Stefano DellaVigna

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Outline

1. Market Reaction to Biases: Behavioral Finance
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. Methodology: Markets and Non-Standard Behavior

7. Summary of Evidence

8. Concluding Remarks

1 Market Reaction to Biases: Behavioral Finance

- Who do 'smart' investors respond to investors with biases?

- First, brief overview of anomalies in Asset Pricing (from Barberis and Thaler, 2004)

  1. **Underdiversification.**

     (a) Too few companies.

     - Investors hold an average of 4-6 stocks in portfolio.
     - Improvement with mutual funds

     (b) Too few countries.

     - Investors heavily invested in own country.
     - Own country equity: 94% (US), 98% (Japan), 82% (UK)

- Own area: own local Bells (Huberman, 2001)

(c) Own company

- In companies offering own stock in 401(k) plan, substantial investment in employer stock

2. **Naive diversification.**
   - Investors tend to distribute wealth 'equally' among alternatives in 401(k) plan (Benartzi and Thaler, 2001; Huberman and Jiang, 2005)

3. **Excessive Trading.**
   - Trade too much given transaction costs (Odean, 2001)

4. **Disposition Effect in selling**
   - Investors more likely to sell winners than losers

5. **Attention Effects in buying**
   - Stocks with extreme price or volume movements attract attention (Odean, 2003)

- Should market forces and arbitrage eliminate these phenomena?

- **Arbitrage**:
  - Individuals attempt to maximize individual wealth
  - They take advantage of opportunities for free lunches

- Implications of arbitrage: 'Strange' preferences do not affect pricing

- Implication: For prices of assets, no need to worry about behavioral stories

- Is it true?

- Fictitious example:
  - Asset A returns \$1 tomorrow with $p = .5$
  - Asset B returns \$1 tomorrow with $p = .5$

  - Arbitrage –> Price of A has to equal price of B
  - If $p_A > p_B$,
    - sell A and buy B
    - keep selling and buying until $p_A = p_B$
  - Viceversa if $p_A < p_B$

- Problem: Arbitrage is limited (de Long et al., 1991; Shleifer, 2001)
- In Example: can buy/sell A or B and tomorrow get fundamental value
- In Real world: prices can diverge from fundamental value
- Real world example. Royal Dutch and Shell
  - Companies merged financially in 1907
  - Royal Dutch shares: claim to 60% of total cash flow
  - Shell shares: claim to 40% of total cash flow
  - Shares are nothing but claims to cash flow

– Price of Royal Dutch should be 60/40=3/2 price of Shell

- p_{RD}/p_S differs substantially from 1.5 (Fig. 1)

Fig. 1. Log deviations from Royal Dutch/Shell parity. Source: Froot and Dabora (1999).

- Plenty of other example (Palm/3Com)

- What is the problem?
  - Noise trader risk, investors with correlated valuations that diverge from fundamental value
  - (Example: Naive Investors keep persistently bidding down price of Shell)
  - In the long run, convergence to cash-flow value
  - In the short-run, divergence can even increase
  - (Example: Price of Shell may be bid down even more)

- **Noise Traders**

- DeLong, Shleifer, Summers, Waldman (*JPE* 1990)

- Shleifer, *Inefficient Markets*, 2000

- Fundamental question: What happens to prices if:
  - (Limited) arbitrage
  - Some irrational investors with correlated (wrong) beliefs

- First paper on Market Reaction to Biases

- *The* key paper in Behavioral Finance

The model assumptions

A1: arbitrageurs risk averse and short horizon

$\longrightarrow$ Justification?

* Short-selling constraints

  (per-period fee if borrowing cash/securities)

* Evaluation of Fund managers.

* Principal-Agent problem for fund managers.

A2: noise traders (Kyle 1985; Black 1986)

misperceive future expected price at t by

$\rho_t \overset{i.i.d.}{\sim} \mathcal{N}(\rho^*, \sigma_\rho^2)$

misperception *correlated* across noise traders ($\rho^* \neq 0$)

$\longrightarrow$ Justification?

* fads and bubbles (Internet stocks, biotechs)

* pseudo-signals (advice broker, financial guru)

* behavioral biases / misperception riskiness

What else?

- μ noise traders, $(1-\mu)$ arbitrageurs
- OLG model
  - Period 1: initial endowment, trade
  - Period 2: consumption
- Two assets with identical dividend r
  - safe asset: perfectly elastic supply
    $\Longrightarrow$ price=1 (numeraire)
  - unsafe asset: inelastic supply (1 unit)
    $\Longrightarrow$ price?
- Demand for unsafe asset: λ^a and λ^n, with $\lambda^a + \lambda^n = 1$.

- CARA:

$U(w) = -e^{-2(\gamma w)}$ (w wealth when old)

$$E\left[U(w)\right] = \int_{\infty}^{\infty} -e^{-2\gamma w} \cdot \frac{1}{\sqrt{2\pi\sigma^2}} \cdot e^{-\frac{1}{2\sigma^2}(w-\overline{w})}$$

$$= -e^{-2\gamma(\overline{w}-\gamma\sigma_w^2)}$$

$$\Downarrow$$

$$\max E\left[U(w)\right] \quad \underset{\text{pos. mon. transf.}}{\curvearrowright} \quad \max \overline{w} - \gamma\sigma_w^2$$

Arbitrageurs:

$$\max(w_t - \lambda_t^a p_t)(1+r)$$

$$+\lambda_t^a(E_t[p_{t+1}] + r)$$

$$-\gamma\,(\lambda_t^a)^2\,Var_t(p_{t+1})$$

Noise traders:

$$\max(w_t - \lambda_t^n p_t)(1+r)$$

$$+\lambda_t^n(E_t[p_{t+1}] + \rho_t + r)$$

$$-\gamma\,(\lambda_t^n)^2\,Var_t(p_{t+1})$$

(Note: Noise traders know how to factor the effect of future price volatility into their calculations of values.)

f.o.c.

Arbitrageurs: $\frac{\partial E[U]}{\partial \lambda_t^a} \stackrel{!}{=} 0$

$$\lambda_t^a = \frac{r + E_t[p_{t+1}] - (1+r)p_t}{2\gamma \cdot Var_t(p_{t+1})}$$

Noise traders: $\frac{\partial E[U]}{\partial \lambda_t^n} \stackrel{!}{=} 0$

$$\lambda_t^n = \frac{r + E_t[p_{t+1}] - (1+r)p_t}{2\gamma \cdot Var_t(p_{t+1})}$$

$$+ \quad \frac{\rho_t}{2\gamma \cdot Var_t(p_{t+1})}$$

Interpretation

- Demand for unsafe asset function of:
  - (+) expected return $(r + E_t[p_{t+1}] - (1 + r)p_t)$
  - (-) risk aversion (γ)
  - (-) variance of return $(Var_t(p_{t+1}))$
  - (+) overestimation of return ρ_t (noise traders)

- Notice: noise traders hold more risky asset than arb. if $\rho > 0$ (and viceversa)

- Notice: Variance of prices come from noise trader risk. "Price when old" depends on uncertain belief of next periods' noise traders.

Impose general equilibrium: $\lambda^a + \lambda^n = 1$

Price

$$p_t = 1 + \frac{\mu(\rho_t - \rho^*)}{1+r} + \frac{\mu\rho^*}{r} - \frac{2\gamma\mu^2\sigma_\rho^2}{r(1+r)^2}$$

- Noise traders affect prices!

Interpretation

- Term 1: Variation in noise trader (mis-)perception
- Term 2: Average misperception of noise traders
- Term 3: Compensation for noise trader risk
- Special case: $\mu = 0$ (no noise traders)

Relative returns of noise traders

- Compare returns to noise traders R^n to returns for arbitrageurs R_a:

$$\Delta R = R^n - R^a = (\lambda_t^n - \lambda_t^a)\left[r + p_{t+1} - p_t\left(1 + r\right)\right]$$

$$E\left(\Delta R\right) = \rho^* - \frac{\left(1 + r\right)^2 \left(\rho^*\right)^2 + \left(1 + r\right)^2 \sigma_\rho^2}{2\gamma\mu\sigma_\rho^2}$$

- Noise traders hold more risky asset if $\rho^* > 0$
- Return of noise traders can be higher if $\rho^* > 0$ (and not too positive)
- Noise traders therefore may outperform arbitrageurs if optimistic!
- (Reason is that they are taking more risk)

Welfare

- Sophisticated investors have higher utility
- Noise traders have lower utility than they expect
- Noise traders may have higher returns (if $\rho^* > 0$)
- Noise traders do not necessarily disappear over time

- Three fundamental assumptions

  1. OLG: no last period; short horizon

  2. Fixed supply unsafe asset (a cannot convert safe into unsafe)

  3. Noise trader risk systematic

- Noise trader models imply that biases affect asset prices:

  – Reference Dependence

  – Attention

  – Persuasion

- Here:
  - Biased investors
  - Non-biased investors
- Behavioral corporate finance:
  - Investors (biased)
  - CEOs (smart)
- Behavioral Industrial Organization:
  - Consumers (biased)
  - Firms (smart)

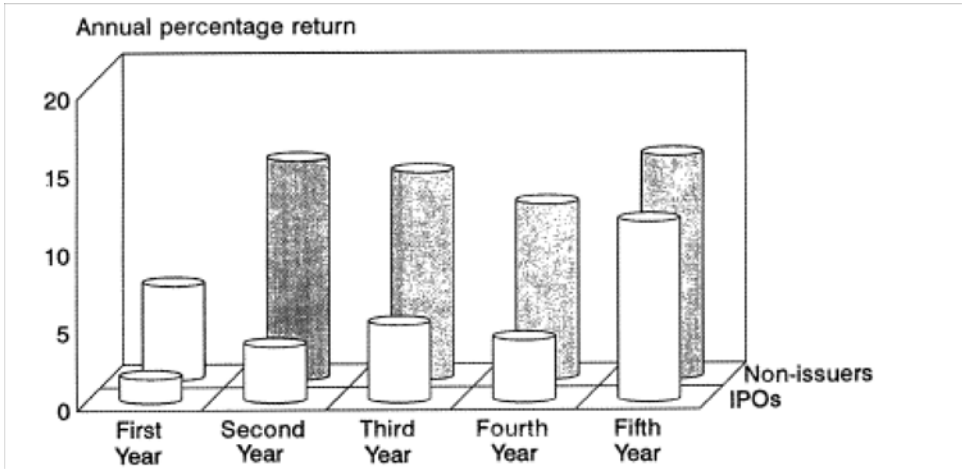
2 Market Reaction to Biases: Corporate Decisions

- **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

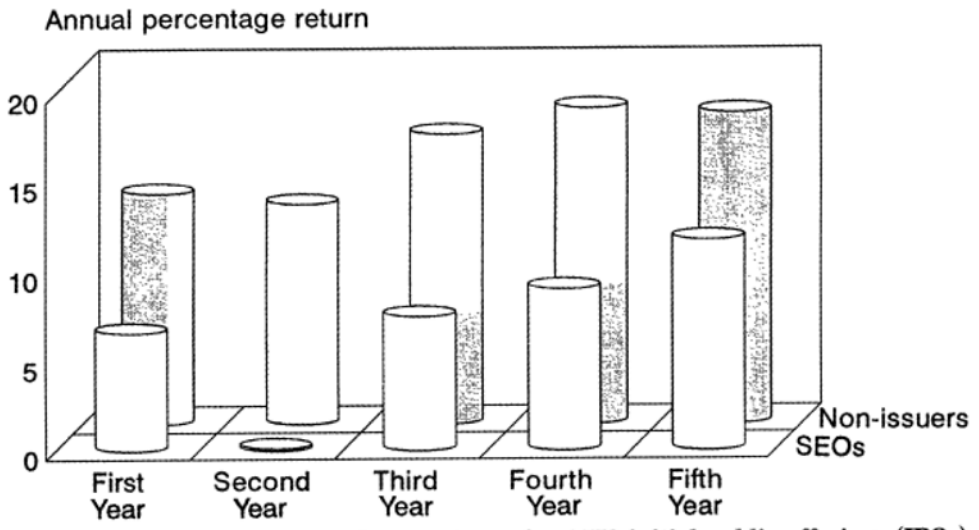
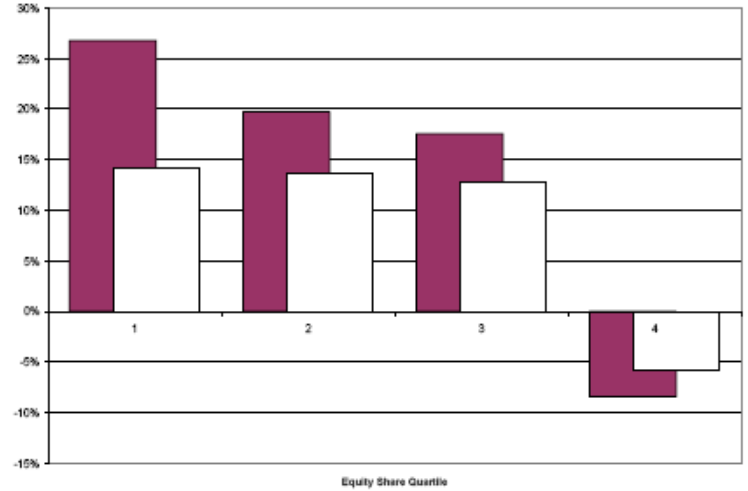


Figure 2. The average annual raw returns for 4,753 initial public offerings (IPOs), and their matching nonissuing firms (top), and the average annual raw returns for 3,702 seasoned equity offerings (SEOs), and their matching nonissuing firms (bottom), during the five years after the issue. The equity 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

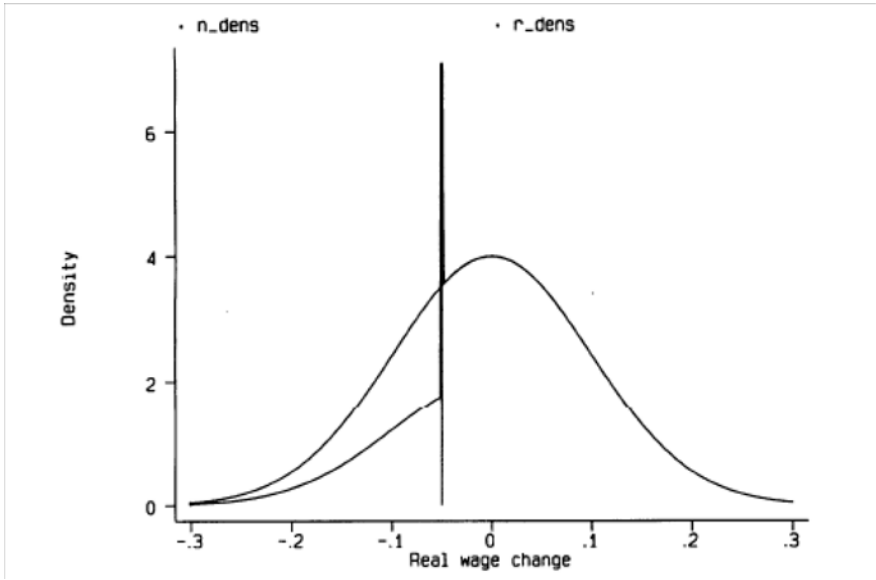
- Employee dislike for nominal wage cuts
- **Kahneman, Knetsch and Thaler (1986)**: Telephone surveys in Canada in 1984 and 1985 –> Ask questions on fairness

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?

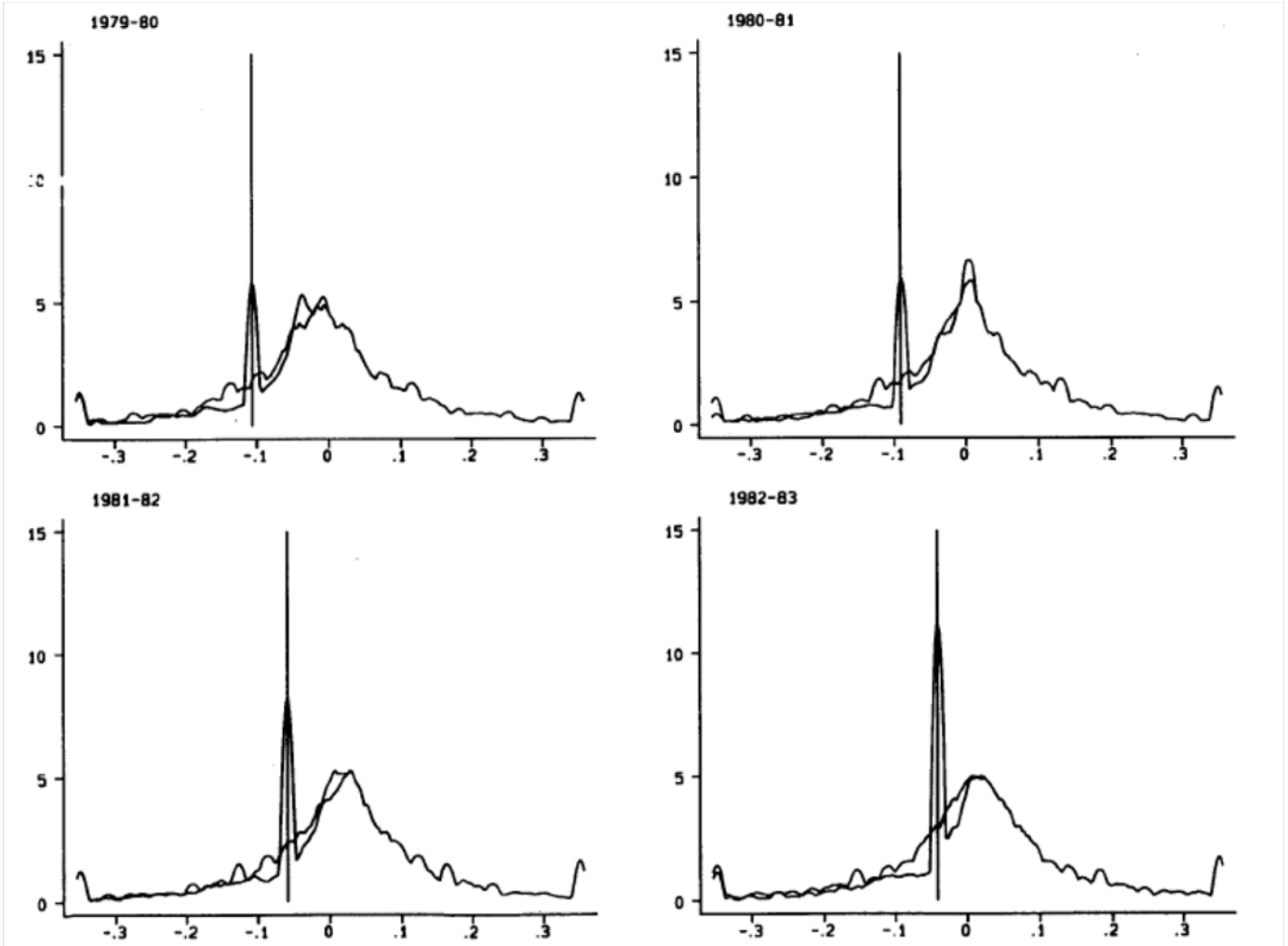


Figure 4: Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1979-80 to 1982-83

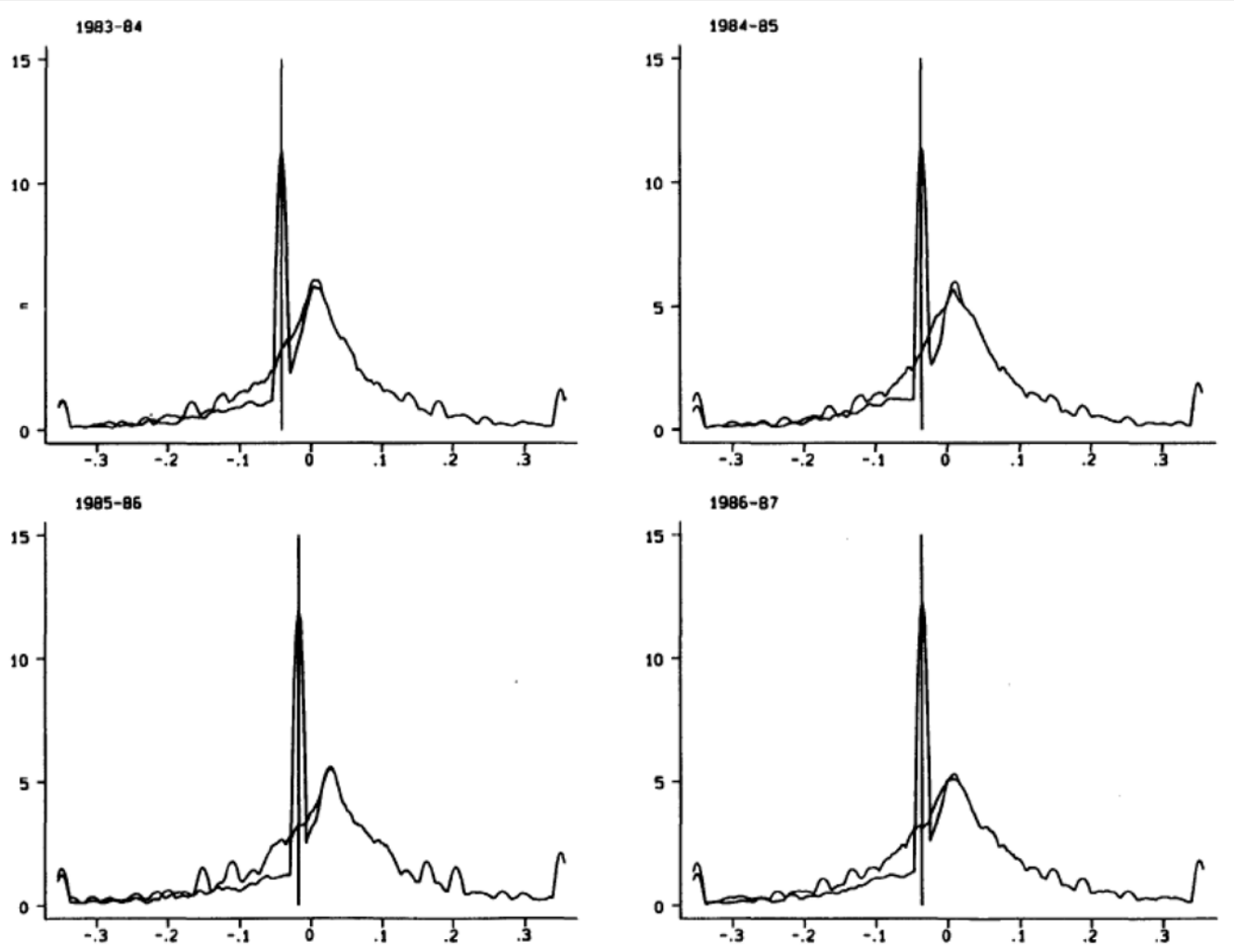


Figure 4 (Continued): Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1983-84 to 1986-87

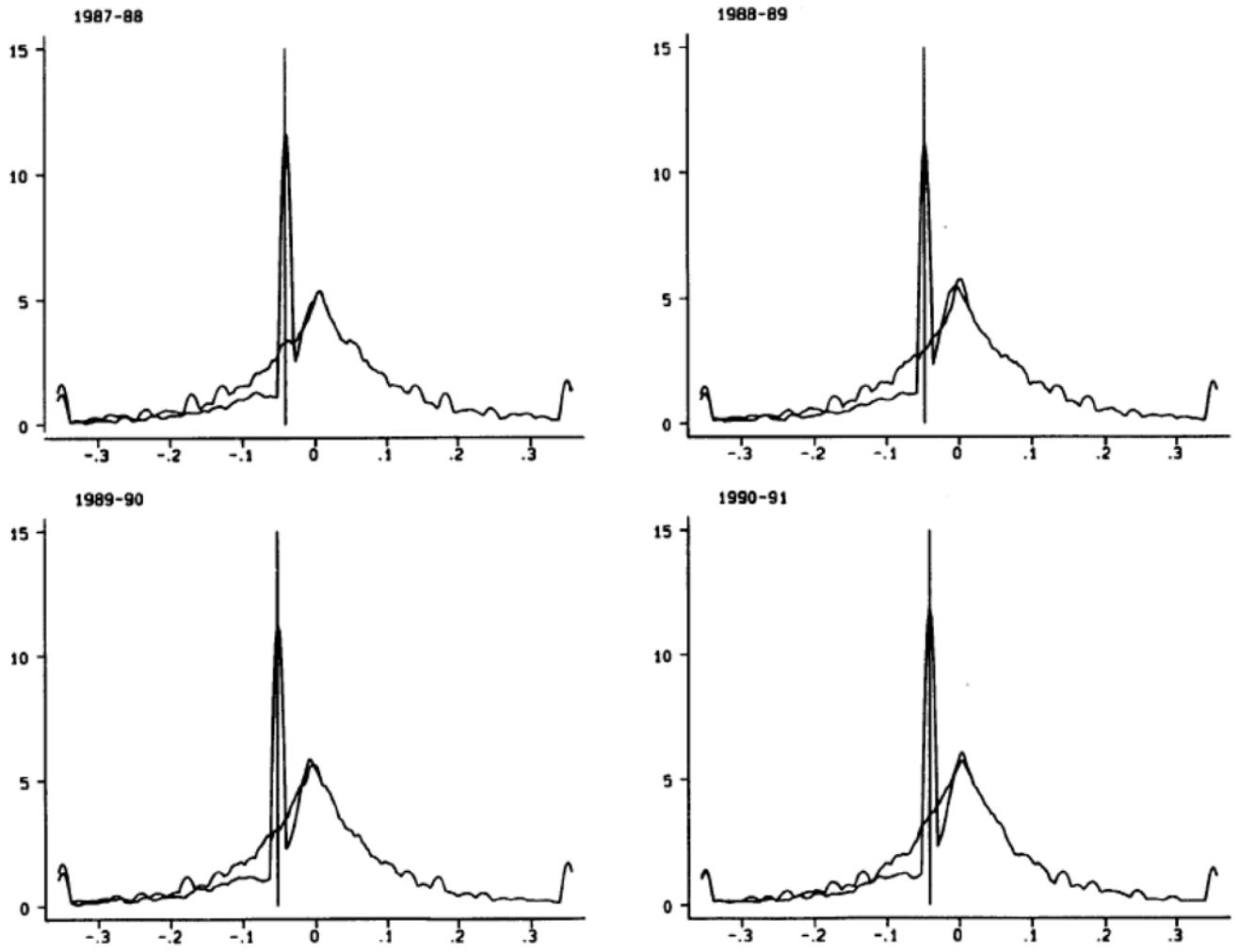


Figure 4 (Continued): Smoothed (Kernel) Estimates of Actual and Counterfactual Densities of Real Wage Changes, CPS Samples from 1987-88 to 1990-91

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)

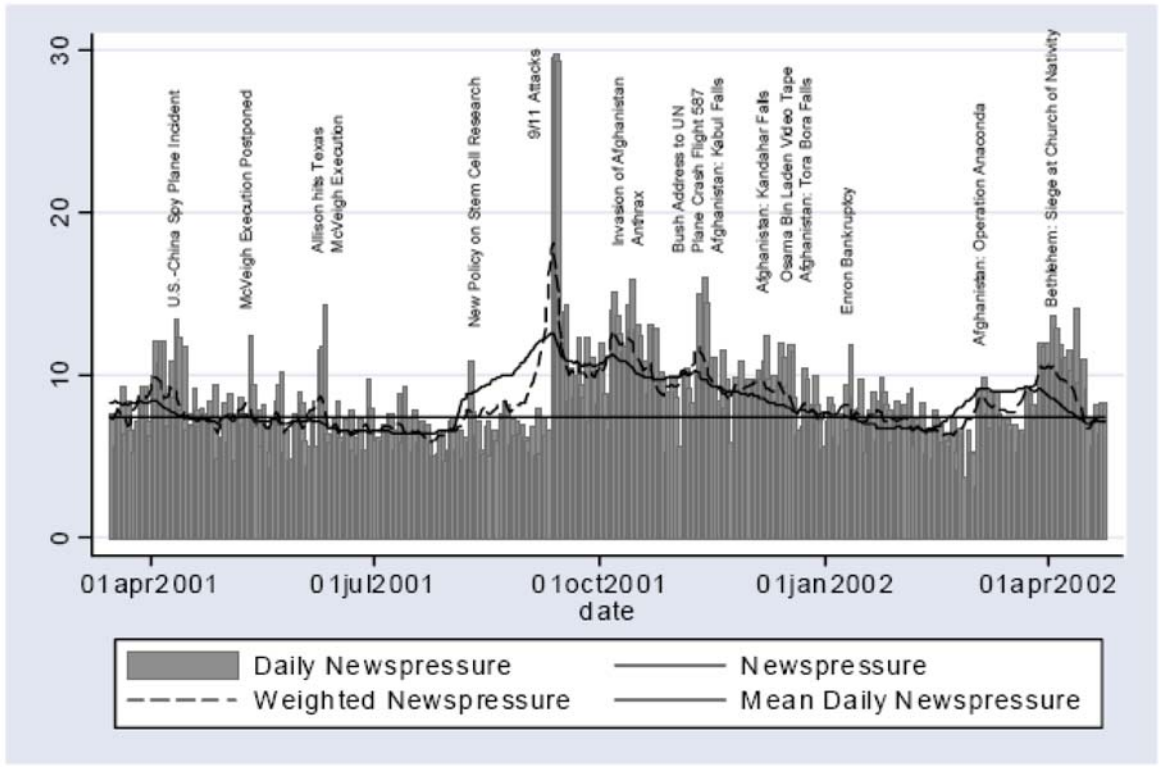


FIGURE IV
News Pressure (Minutes) during 405 Days, 15 March 2001 – 23 Apr 2002, by Day

- 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 Methodology: Markets and Non-Standard Behavior

- Why don't market forces eliminate non-standard behavior?
- Common Chicago-type objection
- **Argument 1.** Experience reduces non-standard behavior.
  - Experience appears to mitigate the endowment effect (List, 2003 and 2004).
  - Experience improves ability to perform backward induction (Palacios-Huerta and Volji, 2007 and 2008)
  - BUT: Maybe experience does not really help (Levitt, List, and Reiley, 2008)

- What does experience imply in general?
  - Feedback is often infrequent (such as in house purchases) or noisy (such as in financial investments) –>not enough room for experience
  - Experience can exacerbate a bias if individuals are not Bayesian learners (Haigh and List 2004)
  - Not all non-standard features should be mitigated by experience. Example: social preferences
  - Debiasing by experienced agents can be a substitute for direct experience. However, as Gabaix and Laibson (2006) show, experienced agents such as firms typically have little or no incentive to debias individuals

- *Curse of Debiasing* (Gabaix-Laibson 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 –> 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

- 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

- System of transfers:
  - Firms take advantage of naive consumers
  - Sophisticated consumers benefit from naive consumers
- Related: Suppose Credit Card B can identify naive consumer
  - What should it do?
  - If debias, then lose consumer
  - Rather, take advantage of consumer

- **Argument 2.** Even if experience or debiasing do not eliminate the biases, the biases will not affect aggregate market outcomes
  - Arbitrage –> Rational investors set prices
  - However, limits to arbitrage (DeLong et al., 1991) –> 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 (2007) on overbidding in eBay auctions

eBay Auctions

- Proxy bidding
  - Bidders submit “maximum willingness to pay”
  - Quasi-second price auction: price outstanding increased to prior leading maximum willingness to pay + increment (see Table 1).
- Fixed prices (“Buy-it-now”)
  - Immediate purchase.
  - Listing on same webpage, same list, same formatting.
  - About 1/3 of eBay listings

→ Key ingredient for analysis.

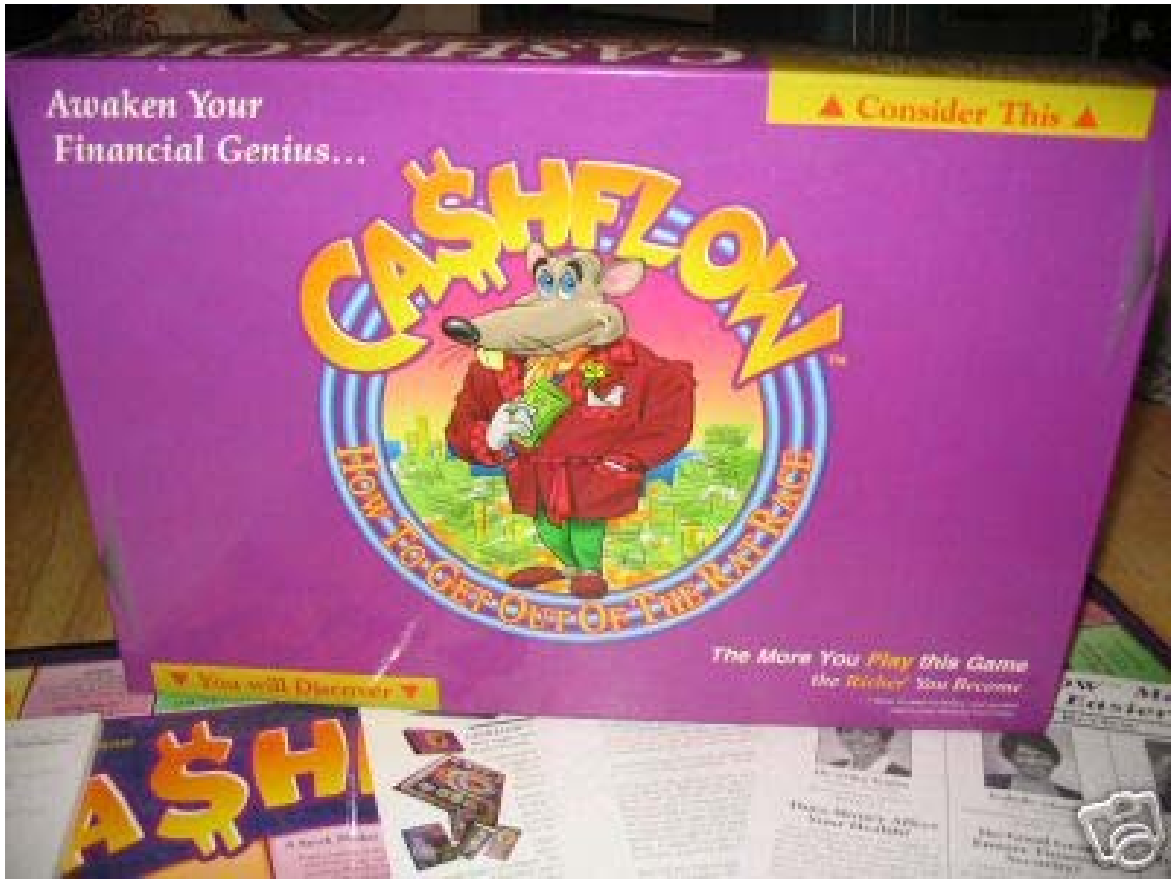
→ Persistent presence of buy-it-now price as a (conservative) upper limit of bids

Identification of Overbidding

Overbidding = bidding more than value of auction object to bidder
or alternative purchase price ← more than alternative price

1. Hard to measure: Where does *over*-bidding exactly start?
2. Hard to evaluate cause.
   - **Incentive misalignment**
   – Private benefits from having the top pick/desired target (prestige)
   – Empire building
   – Career concerns
   - **Winner's curse**
   - **Other non-standard bidding behavior**
   – Utility from bidding
   – Bidding fever (emotions)
   – Sunk cost (having submitted a bid)
   – Limited attention to lower outside prices / too much attention to advertising

The Object


Awaken Your
Financial Genius…
Consider This
CASHFLOW
HOW TO GET OUT OF THE RAT RACE
The More You Play this Game
the Richer You Become
You will Discover

The Data

- Hand-collected data of all auctions and Buy-it-now transactions of Cashflow 101 on eBay from 2/19/2004 to 9/6/2004.
- Cashflow 101: board game with the purpose of finance/accounting education.
- Retail price : $195 plus shipping cost ($10.75) from manufacturer (*www.richdad.com*).
- Two ways to purchase Cashflow 101 on eBay
  - Auction (quasi-second price proxy bidding)
  - Buy-it-now

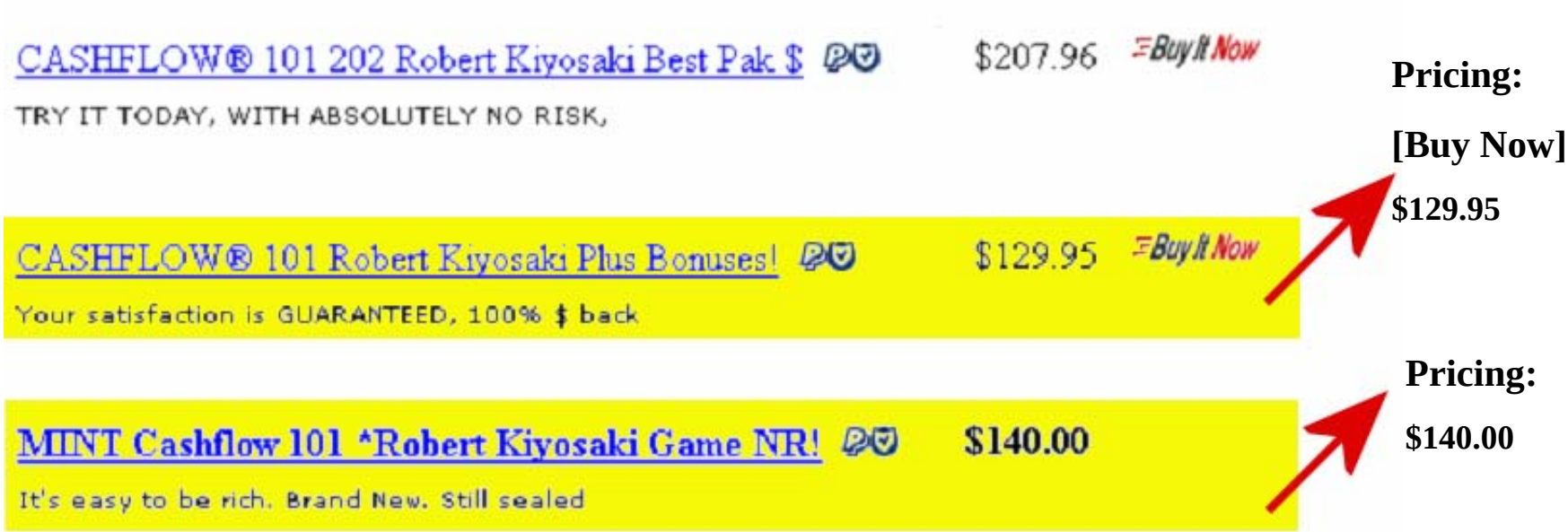
Sample

- Listings (excluding non-US$, bundled offers)
  - 287 by individuals (187 auctions only, 19 auctions with buy-it-now option)
  - 401 by two retailers (only buy-it-now)
- Remove terminated, unsold items, hybrid offers that ended early (buy-it-now) and items without simultaneous *professional* buy-it-now listing. → 2,353 bids, 806 bidders, 166 auctions
- Buy-it-now offers of the two retailers
  - Continuously present for all but six days. (Often individual buy-it-now offers present as well; they are often lower.)
  - 100% and 99.9% positive feedback scores.
  - Same prices **$129.95** until 07/31/2004; **$139.95** since 08/01/2004.
  - Shipping cost **$9.95**; other retailer $10.95.
  - New items (with bonus tapes/video).

Listing Example (02/12/2004)

Rich Dad's Cashflow Quadrant, Rich dad ...	**$12.50**	4	1d 00h 14m
Rich Dad's Cashflow Quadrant by Robert T. ...	**$9.00**	9	1d 00h 43m
Real Estate Investment Cashflow Software $$$!	**$10.49**	2	1d 04h 36m
CASHFLOW® 101 202 Robert Kiyosaki Best Pak $	$207.96	Buy It Now	1d 06h 47m
TRY IT TODAY, WITH ABSOLUTELY NO RISK,			
CASHFLOW® 101 Robert Kiyosaki Plus Bonuses!	$129.95	Buy It Now	1d 08h 02m
Your satisfaction is GUARANTEED, 100% $ back			
MINT Cashflow 101 *Robert Kiyosaki Game NR!	**$140.00**	13	1d 08h 04m
It's easy to be rich. Brand New. Still sealed			
cashflow Hard Money Funding 101 real estate	$14.99	Buy It Now	1d 09h 28m
BRANDNEW RICHDAD CASHFLOW FOR KIDS E-GAME	**$20.00**	1	1d 13h 54m
CASHFLOW® 101 Robert Kiyosaki Plus Bonuses!	$129.95	Buy It Now	1d 14h 17m
Your satisfaction is GUARANTEED, 100% $ back			
CASHFLOW® 101 202 Robert Kiyosaki Best Pak $	$207.96	Buy It Now	1d 15h 47m
TRY IT TODAY, WITH ABSOLUTELY NO RISK,			

Listing Example – Magnified



Pricing:

[Buy Now]

$129.95

Pricing:

$140.00

Overbidding

Given the information on the listing website:

- (H0) An auction should never end at a price above the concurrently available purchase price.

Figure 1. Starting Price (*startprice*)

➔ 46% below $20; mean=$46.14; SD=43.81

➔ only 3 auctions above buy-it-now

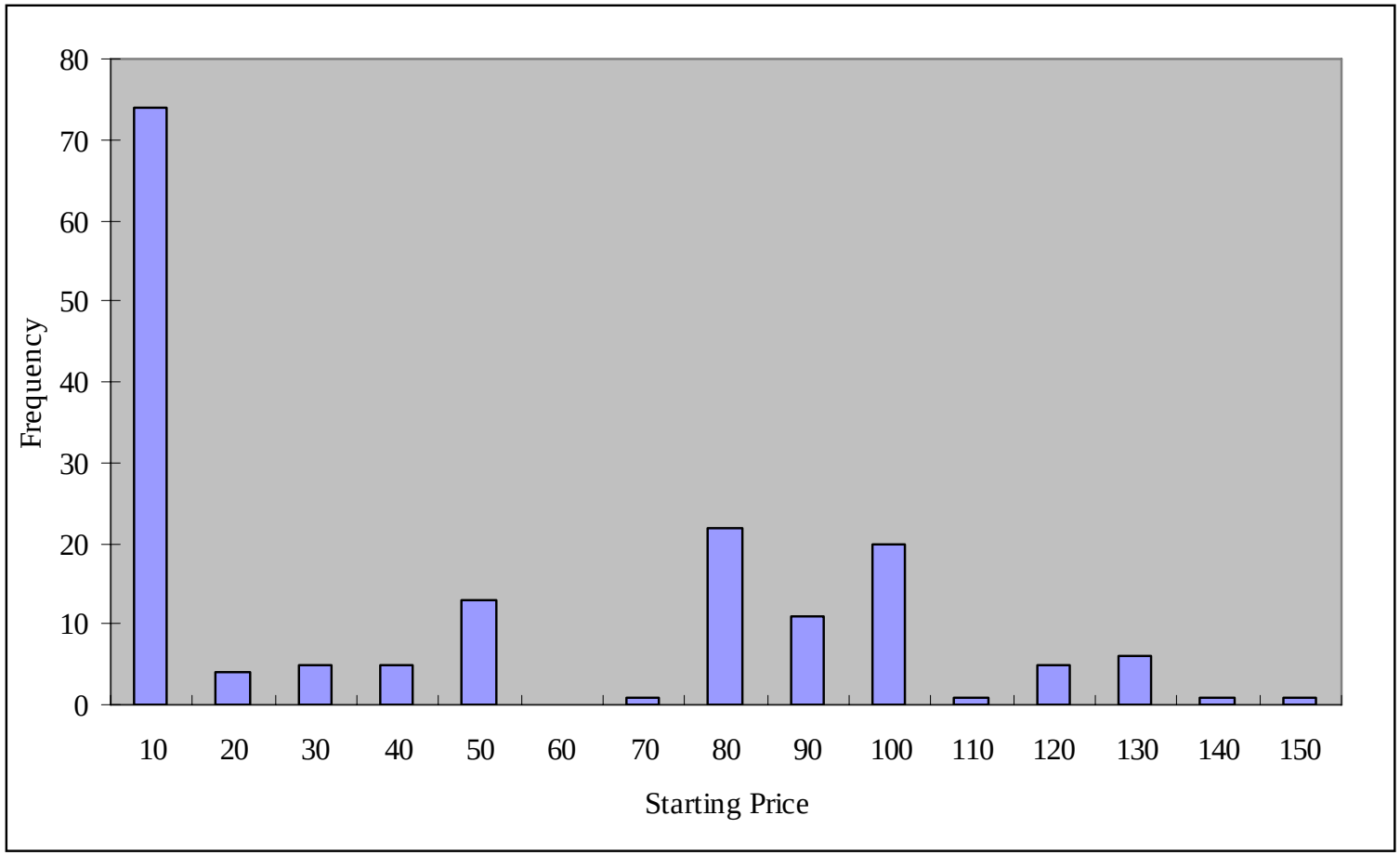


Figure 2. Final Price (*finalprice*)

➔ 43% are above "buy-it-now" (mean $132.55; SD 17.03)

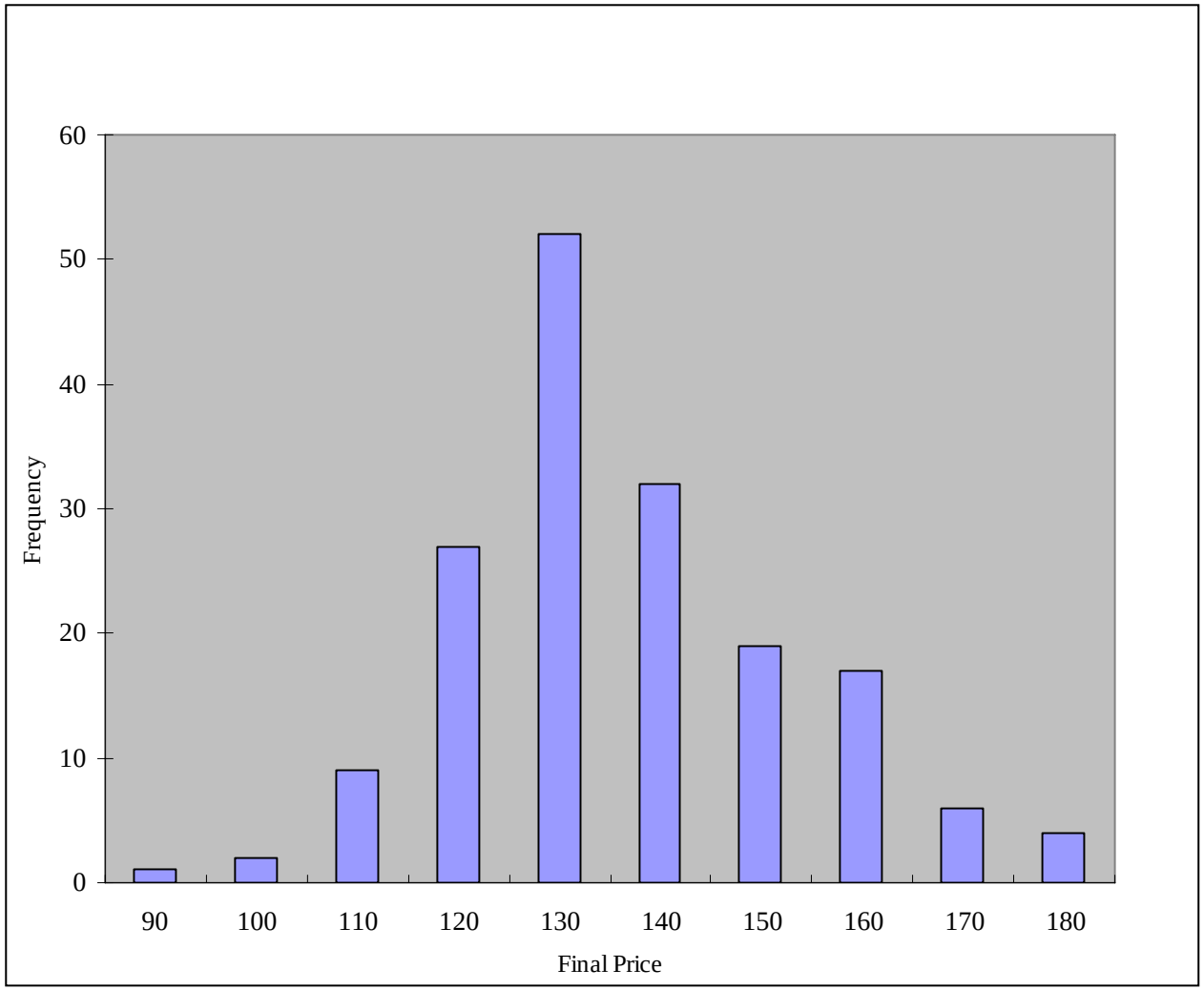
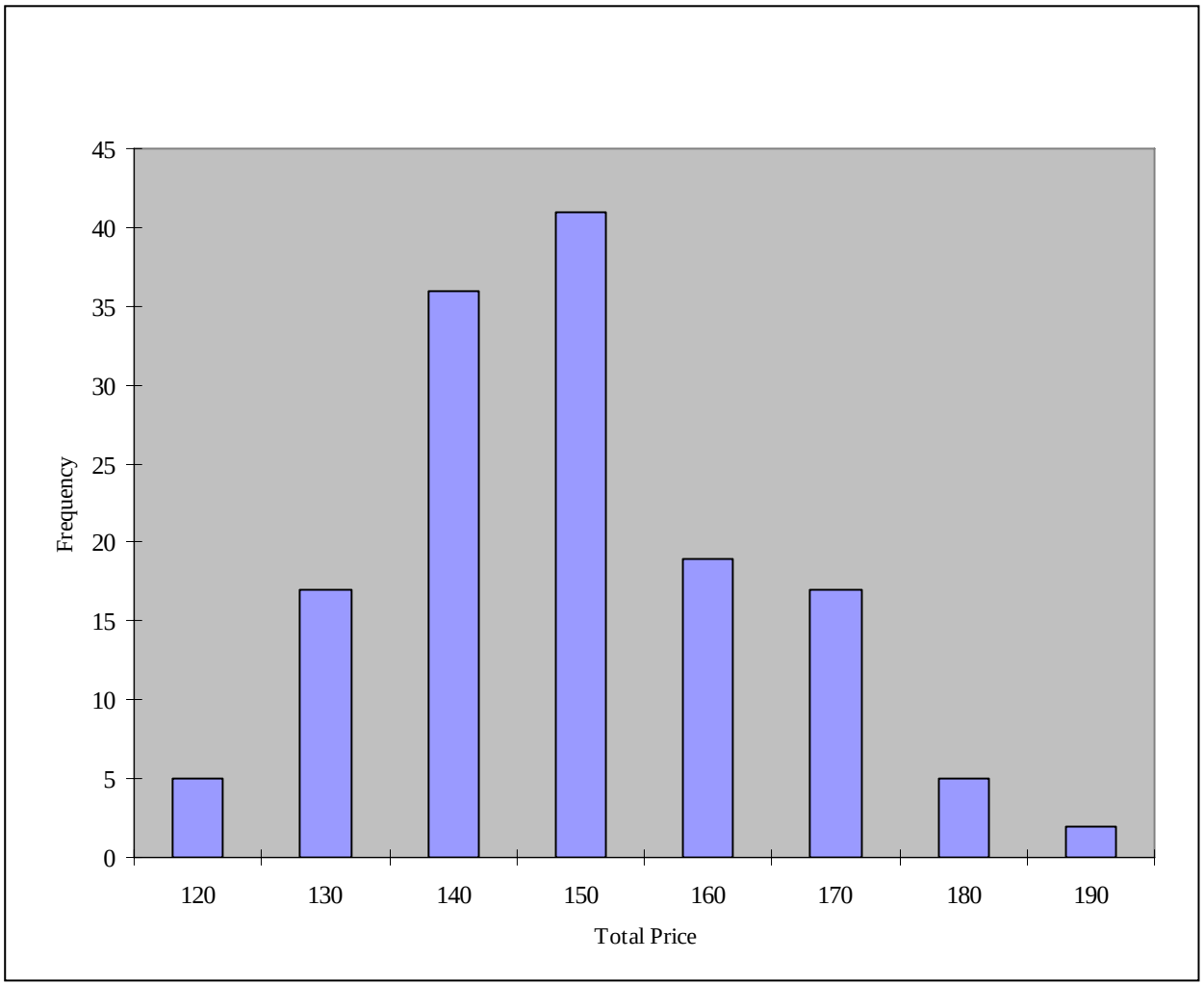


Figure 4. Total Price (incl. shipping cost)

➔ 72% are above “buy-it-now” plus its shipping cost (mean=$144.68; SD=15.29)



Alternative Explanations

1. “Noise”: are these penny-difference
2. Quality differences (I): quality of item
3. Quality differences (II): quality of seller
4. Concerns about unobserved wording differences between auctions and buy-it-now posting.
5. Concerns about consumers’ understanding of buy-it-now posting.

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

7 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):
- **Menu choice.** Need to observe:
  - menu of options
  - later utilization

1.
   - 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):

- **Natural Experiments**

1. - 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):

- **Field experiments**

1. (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):

- **Correlational studies**

1. (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):

- **Structural Identification**

1. (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

8 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
   - *Rule 1.* Study the techniques
   - Everyone needs a reasonable knowledge of:
     * Modelling skills (decisions, game theory, contracts)
     * Econometrics (asymptotics, applied metrics)
     * (At least) One Field (methodology, questions, previous research)

- *Rule 2.* Think of interesting ideas
- Start from new idea, not from previous papers. Ex.: Mas-Moretti on Safeway data
- Think of an idea that can fix a broken literature (Levitt). Ex.: Fehr-Goette on cab drivers
- *Rule 3.* Explore technique you need for idea
  * Idea come first
  * It will be much easier to learn technique once you have an interesting problem at hand

3. What are good ideas?

   - 1% of GDP (Glaeser)
   - New questions (better) or unknown answers
   - Questions you care about (comparative advantage: List)
   - Socially important topics, if you can

4. 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

5. 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!