Econ 219B
Psychology and Economics: Applications
(Lecture 6)

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Outline

1. Five Applications of Reference Dependence
2. Decisions under Risk
3. Framing: Coherent Arbitrariness
4. Framing: Environmental Evaluations

4 Five Applications of Reference Dependence

- (Mostly) two categories of applications of prospect theory/reference dependence:

  1. **Field Test (F).** Field evidence

  2. **Experimental Test (E).** Lab evidence

  3. (**Theory (T).** Applied theory almost absent)

- Features of literature:

  - Lack of theory serious issue

  - Crucial choice of reference point

  - Mostly use loss aversion + linear value function

  - Some use concavity + convexity

4.1 Endowment Effect

- Kahneman, Knetsch and Thaler (1991) **(E)**
- List (2003,2004) **(F)**
- Recent critical survey by Plott and Zeiler (2003)
- See previous lecture
- WTA>WTP
- Decreased volume of trade

4.2 Myopic Loss Aversion

- Benartzi and Thaler (1995) **(F)**

- Equity premium.
  - Stocks not so risky
  - Do not covary much with GDP growth
  - BUT equity premium 3.9% over bond returns (US, 1871-1993)

- Need very high risk aversion: $RRA \geq 20$

- Benartzi and Thaler: Need loss aversion + narrow framing

- Periodically evaluate returns from stocks

- Loss aversion from (nominal) losses—> Deter from stocks

- More frequent evaluation—>Losses more likely –> Fewer stock holdings

- Calibrate model with λ (loss aversion) 2.25 and full prospect theory specification

- If evaluate every year, indifferent between stocks and bonds

- (Similar results with piecewise linear utility)

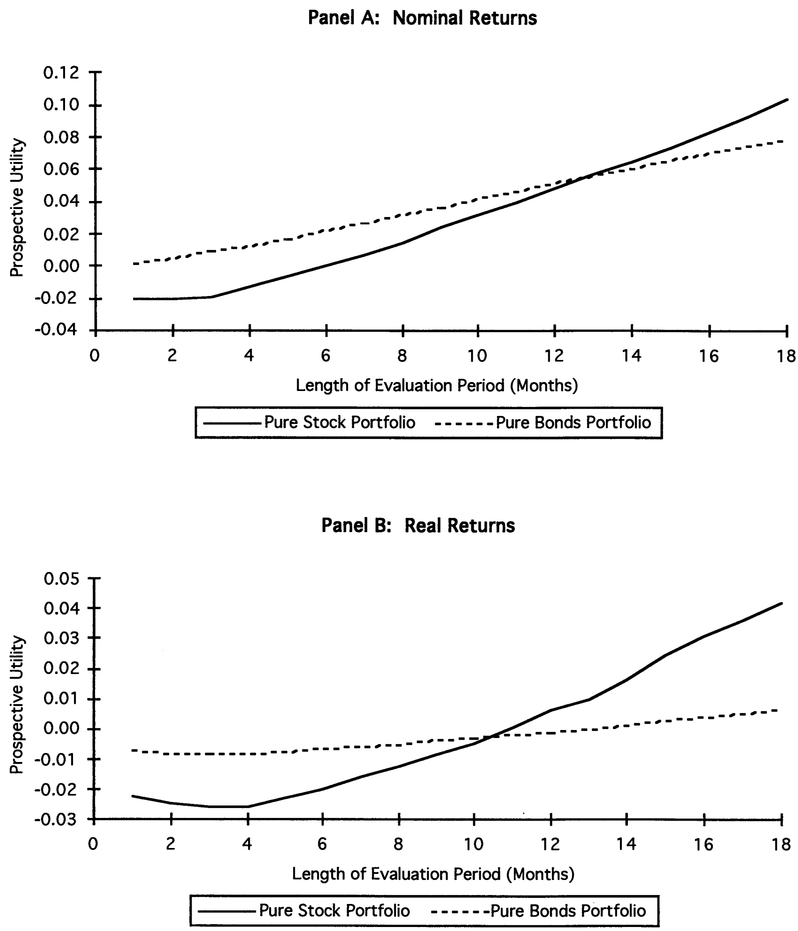

FIGURE I
Prospective Utility as Function of the Evaluation Period

a reliability check on the previous results. Suppose that an investor is maximizing prospective utility with a one-year horizon. What mix of stocks and bonds would be optimal? We investigate this question as follows. We compute the prospective utility of each portfolio mix between 100 percent bonds and 100 percent stocks, in 10 percent increments. The results are shown in Figure II, using nominal returns. (Again, the results for real returns are similar.) As the figure shows, portfolios between about 30 percent and 55 percent stocks all yield approximately the same prospective value.

sion plays the role of risk aversion in standard models, and can be considered a fact of life (or, perhaps, a fact of preferences). In contrast, the frequency of evaluations is a policy choice that presumably could be altered, at least in principle. Furthermore, as the charts in Figure I show, stocks become more attractive as the evaluation period increases. This observation leads to the natural question: by how much would the equilibrium equity premium fall if the evaluation period increased?

Figure III shows the results of an analysis of this issue using real returns on stocks, and the real returns on five-year bonds as the comparison asset. With the parameters we have been using, the actual equity premium in our data (6.5 percent per year) is consistent with an evaluation period of one year. If the evaluation period were two years, the equity premium would fall to 4.65 percent. For five, ten, and twenty-year evaluation periods, the corresponding figures are 3.0 percent, 2.0 percent, and 1.4 percent. One way to think about these results is that for someone with a twenty-year investment horizon, the psychic costs of evaluating the portfolio annually are 5.1 percent per year! That is, someone with a twenty-year horizon would be indifferent between stocks and bonds if the equity premium were only 1.4 percent, and the remaining 5.1 percent is potential rents payable to those who are

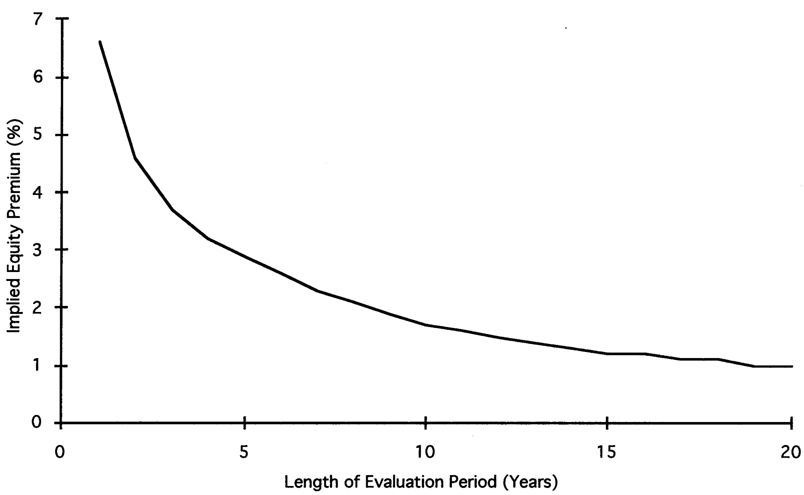

FIGURE III
Implied Equity Premium as Function of the Evaluation Period

4.3 Asset prices

- Barberis, Huang, and Santos (2001) **(T+F)**

- Piecewise linear utility, $\lambda = 2.25$

- Narrow framing at aggregate stock level

- Range of implications for asset pricing

- Barberis and Huang (2001)

- Narrowly frame at individual stock level (or mutual fund)

4.4 Disposition effect

- Odean (1998) **(F)**

- Do investors sell winning stocks more than losing stocks?

- (Similar to not selling 'losing' house)

- Tax advantage to sell losers

- Losers outperform winners in long-run

- Prospect theory:

  – reference point: price of purchase

  – convexity over losses —> gamble, hold on stock

– concavity over gains —> risk aversion, sell stock

- Discount brokerage house (1987-1993)

- Compute share:

$$PGR = \frac{\text{Realized Gains}}{\text{Realized Gains+Paper Gains}}$$

and similar for Losses, PGL

- PGR>PGL for all months, except end of year (tax reasons)

4.5 Preferences for increasing sequences

- Loewenstein-Sicherman, *Do Workers Prefer Increasing Wage Profiles?* **(E)**

- Reference point past wage

- Aversion to nominal wage cut

- Choice between paths of wages over lifetime

- N=80, Museum of Science visitors, survey

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	Wages	Rental income
Prefer increasing	83%	56%
Prefer decreasing	17%	44%

- Interesting debiasing experiment.

- Present arguments both for increasing and for decreasing

- Increase in choices consistent with PVmax: 7% to 22% (wages)

- Increase in choices consistent with PVmax: 23% to 28% (rental income)

- Taste for consistency — debiasing as between manipulation

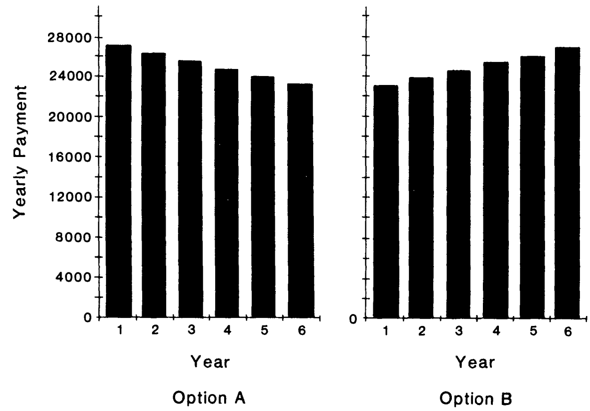

FIG. 2.—Graphical depiction of increasing and decreasing payment options

Next, respondents were presented with the same two sequences, depicted graphically, and with conflicting arguments why they should prefer one or the other. The argument favoring decreasing payments read, "Some researchers believe people should prefer option A [the declining sequence]. Their argument is that you can put part of the extra money you get at the beginning into the bank and withdraw it with interest later on. In fact, by choosing option A you could have more money every year."

The argument favoring increasing payments was, "Other researchers believe people should prefer option B [the increasing payment profile]. Their argument is that, first, it is satisfying to get a bigger payment each year. Second, even though you *could* save money in the first few years, it is often difficult to save money. Option B gives more spending later without worrying about putting money away in the first few years."

Respondents specified which argument they found more convincing, or whether they found both arguments equally convincing. Finally, they were asked to rerank the seven payment sequences in light of the arguments.

IV. Findings

To begin with, we focus on rankings made prior to exposure to the arguments. For wage payments, only 7.3% of the sample (three out of 41) based their choice solely on present-value consideration (i.e., they ranked the declining sequence first, the flat sequence next, etc.). For rental income, 23.1% (nine out of 39) of choices conformed to present-value maximization. The difference between the two groups is significant ($\chi^2(1) = 3.9, p < .05$). If we look more broadly at the number of respondents who ranked the declining profile highest, a similar pattern emerges. For wage payments, 12.2% of respondents preferred the declining profile over all other options. The comparable figure for rental income payments is 33.3%. On average,

2 Decisions under Risk

- Standard model of decision-making under risk
  - Utility over global wealth
  - Concavity (risk aversion)
  - CRRA or CARA to parametrize

- Basic predictions of the model:
  1. Risk aversion over large stakes
  2. Risk neutrality over small stakes
  3. Risk-averse people should be risk-averse everywhere

- How do these predictions fare?

  1. Risk aversion over large stakes (old literature)

     – Stocks vs. bonds: Yes. But: too much risk aversion – equity premium puzzle

     – House and Car Liability Insurance: Required

     – Life Insurance: Underinsurance

  2. Risk neutrality over small stakes (new literature)

     – NO: Deductible on home Insurance (Sydnor, 2005)

     – NO: Phone wire insurance

     – NO: Deductible on car insurance

     – Warranties?

3. People that are risk-averse in one setting should also be risk-averse in another setting

   – Barsky et al. (1997) – HRS, 11,707 respondents

   – Elicit risk attitude with question on life-time earnings (large-stake risk-aversion)

   – Correlate with:

     ∗ Smoking and drinking

     ∗ Life and health insurance

     ∗ Stocks vs. bonds

   – Very small correlations, although right direction

> Suppose that you are the only income earner in the family, and you have a good job guaranteed to give you your current (family) income every year for life. You are given the opportunity to take a new and equally good job, with a 50–50 chance it will double your (family) income and a 50–50 chance that it will cut your (family) income by a third. Would you take the new job?

If the answer to the first question is "yes," the interviewer continues:

> Suppose the chances were 50–50 that it would double your (family) income, and 50–50 that it would cut it in half. Would you still take the new job?

If the answer to the first question is "no," the interviewer continues:

> Suppose the chances were 50–50 that it would double your (family) income and 50–50 that it would cut it by 20 percent. Would you then take the new job?

The questions separate the respondents into four distinct risk preference categories, depending on the answers to two questions. The categories can be ranked by risk aversion without having to assume a particular functional form for the utility function. The categorical responses (labeled I, II, III, and IV) are summarized in the first column of Table I.

The categorical responses can be thought of as resulting from the following expected utility calculation. Let U be the utility function and c be permanent consumption. An expected utility maximizer will choose the 50–50 gamble of doubling lifetime income as opposed to having it fall by the fraction $1 - \lambda$ if

$$\tfrac{1}{2}U(2c) + \tfrac{1}{2}U(\lambda c) \geq U(c), \tag{1}$$

that is, the expected utility of the income stream offered by the gamble exceeds the expected utility of having the current income stream with certainty.

If one is willing to assume that relative risk aversion $1/\theta = -c \cdot U''/U'$ is constant over the relevant region, the categorical

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most respondents, permanent labor income and permanent income are not that different. We investigate (see below) the extent to which high-wealth and older individuals respond differently to the questions. See question L14 of the Health and Retirement Study, Wave I (page 162 of the survey instrument).

TABLE I

RISK PREFERENCE SURVEY DESIGN

	Gamble[a]	Relative risk aversion ($1/\theta$) Upper bound	Relative risk aversion ($1/\theta$) Lower bound	Relative risk aversion ($1/\theta$) Mean[b]	Relative risk tolerance (θ) Lower bound	Relative risk tolerance (θ) Upper bound	Relative risk tolerance (θ) Mean[b]	Expectation conditional on survey response[c] $1/\theta$	Expectation conditional on survey response[c] θ
I.	Reject both one-third and one-fifth	∞	3.76	15.8	0	0.27	0.11	15.7	0.15
II.	Reject one-third but accept one-fifth	3.76	2	2.9	0.27	0.5	0.36	7.2	0.28
III.	Accept one-third but reject one-half	2	1	1.5	0.5	1	0.68	5.7	0.35
IV.	Accept both one-third and one-half	1	0	0.7	1	∞	1.61	3.8	0.57

a. Gambles all have a 50 percent probability of doubling lifetime income and a 50 percent probability of losing half, one-third, or one-fifth of lifetime income.

b. These columns report the mean if the *true* value is between the lower and upper bounds.

c. These columns give the expected value of relative risk tolerance and relative risk aversion conditional on *observing* response I, II, III, or IV. This conditional expectation takes into account measurement error in the survey response. This baseline case assumes lognormality, no status quo bias, and no persistent measurement error. (See text for details and Table XIV for other cases.)

TABLE IV
RISK TOLERANCE BY BEHAVIORS

Behavior	Percent choosing response I	II	III	IV	Number of responses	Mean risk tolerance[a]
Never smoked	66.3	11.2	10.9	11.4	4276	0.2353
Quit smoking	63.9	11.9	11.2	12.9	4276	0.2425
Smokes now	63.3	11.6	10.4	14.5	3155	0.2474
Does not drink	68.0	9.4	10.2	12.1	4584	0.2344
Drinks	62.4	12.9	11.3	13.2	7123	0.2456
Zero drinks per day	68.0	9.4	10.2	12.1	4584	0.2344
Between zero and one	63.2	12.9	11.5	12.2	5317	0.2418
Between one and two	59.5	13.4	11.5	15.4	1187	0.2549
Between two and five	61.9	11.7	9.0	17.2	441	0.2573
More than five	57.3	12.3	10.1	20.2	178	0.2689
Less than 12 years of education	65.7	8.9	10.8	14.4	3320	0.2448
12 years	67.7	11.4	10.5	10.2	4130	0.2294
13 to 16 years	61.9	13.4	11.2	13.3	3158	0.2463
Over 16 years	57.6	14.6	11.7	15.9	1099	0.2598
Self-employed	63.9	10.4	11.1	14.4	1374	0.2461
Employee	66.0	12.0	10.5	11.3	6397	0.2349
Not working	62.5	11.2	11.4	14.7	3936	0.2497
Nonwesterner	65.5	11.2	10.7	12.4	9811	0.2388
Westerner	59.8	13.1	11.9	14.9	1896	0.2538
Nonimmigrant	65.0	11.9	10.8	12.2	10568	0.2389
Immigrant	61.2	8.2	11.7	18.7	1139	0.2630

The *p*-value for the hypothesis that mean risk tolerance is equal among smokers. quitters, and those who never smoked is 0.0017. The *p*-values for the hypothesis of no difference in risk tolerance according to the other behaviors (drinks, drinks per day, years of education, employment status, region, or immigrant status) are each less than 0.0001.

a. The mean risk tolerance is computed using the baseline parametric model.

period of increasing public awareness of the risks associated with cigarette smoking. Those who quit smoking are somewhat more risk tolerant than those who never smoked, but less risk tolerant than current smokers.

Whether an individual drinks or not is also related to measured risk tolerance. Risk tolerance is higher for those who drink than for those who do not drink. The difference in risk tolerance between drinkers and nondrinkers is about the same as between

TABLE V
DOES MEASURED RISK TOLERANCE PREDICT BEHAVIOR? REGRESSIONS OF BEHAVIORS ON RISK TOLERANCE AND DEMOGRAPHIC VARIABLES

Dependent variable	Mean of dependent variable	Regression coefficient of risk tolerance	Standard error of estimate	R^2
Ever smoke	0.635	0.092 (0.030)	0.469	0.054
Smoke now	0.269	0.068 (0.028)	0.441	0.011
Drinks	0.608	0.099 (0.030)	0.472	0.065
Drinks per day	0.831	0.256 (0.053)	0.835	0.073
Education (years)	12.083	0.265 (0.184)	2.920	0.172
Self-employed	0.117	0.021 (0.020)	0.318	0.024
Immigrant	0.097	0.027 (0.016)	0.248	0.303
No health insurance	0.272	0.196 (0.031)	0.422	0.100
No life insurance	0.294	0.155 (0.028)	0.439	0.073
Owns home	0.805	−0.153 (0.024)	0.383	0.066

The dependent variables are (0,1) except for drinks per day and years of education. The estimated regressions include the following covariates whose estimated coefficients are not reported: constant, age, sex, religion (Catholic, Jewish, other), and race (black, Hispanic, Asian, other). The mean of the dependent variables is given in the second column. The regression coefficient of relative risk tolerance θ is reported in the third column (with standard errors in parentheses). Relative risk tolerance conditional on the survey responses is assigned to each respondent using the baseline statistical model. The last two columns give the standard error and R^2 of the regressions. The regressions are based on 11,707 individuals' responses with two exceptions. For health insurance the sample is the 8642 households not eligible for Medicare. For life insurance the sample is only 11,561 households owing to missing data.

smokers and nonsmokers. Moderate drinking is not generally believed to be a health risk. Table IV shows risk tolerance by drinks per day. Those who take less than one drink per day have a willingness to accept the moderate gambles (II and III) relatively often. As drinks per day increase, there is a monotonic increase in mean risk tolerance. For heavy drinkers, risk tolerance—measured either by willingness to choose gamble IV or by mean risk tolerance—is substantially above average.

The regressions reported in Table V show that the risk tolerance measure predicts smoking and drinking even after control-

TABLE VI
RISK TOLERANCE BY HEALTH INSURANCE COVERAGE AND EMPLOYMENT STATUS

Employment status	Health insurance	Percent choosing response				Number of responses	Mean risk tolerance[a]
		I	II	III	IV		
Self-employed	Yes	63.5	10.0	12.3	14.0	763	0.2459
	No	63.0	10.3	10.0	16.6	319	0.2529
Employee	Yes	66.9	11.8	10.5	10.6	4186	0.2317
	No	58.4	11.4	13.4	16.6	638	0.2643
Not employed	Yes	63.8	11.9	10.9	13.2	1343	0.2424
	No	59.8	10.1	12.0	18.0	1393	0.2647

Tabulation for health insurance excludes Medicare-eligible individuals. The *p*-value for the hypothesis that mean risk tolerance does not differ according to whether or not the respondent has health insurance is 0.4953 for the self-employed, 0.0001 for employees, and 0.0002 for those not employed.

a. The mean risk tolerance is computed using the baseline parametric model.

cially) more risk averse are more likely to purchase both medical and life insurance.[24]

Table VI examines our measure of risk tolerance according to whether or not the individual has health insurance. We do separate tabulations for employees, the self-employed, and those not working. To focus on those who have the option of having insurance or not, this tabulation excludes those in the Medicare-eligible age group.

For each of the three employment classes, more risk tolerant individuals are less likely to have health insurance. For those employed, measured risk tolerance seems to be an important factor sorting individuals into jobs with health insurance. For the not employed, risk preference is a powerful determinant of the propensity to be insured. The effect of risk tolerance on the propensity to be insured is smaller among the self-employed than among the unemployed. Between groups, the self-employed have a higher risk tolerance and have much lower average propensity

24. Researchers have used choices about insurance to elicit estimates of risk aversion. Friedman [1973] used data on choices regarding health insurance, and obtained an estimate of about 10. Szpiro [1986] returns to the idea of gauging risk aversion by studying the demand for insurance. He looks at households' willingness to pay a load factor in order to obtain insurance, using insurance company data on premiums and claims. Using these data, along with the Goldsmith data on total household wealth, Szpiro reports estimates of the coefficient of relative risk aversion between one and two. While these studies are clearly related to our results, their method is to estimate risk aversion from purchase of insurance while our survey creates an independent measure of risk aversion, which can then be related to purchase of insurance.

TABLE VII
RISK TOLERANCE BY LIFE INSURANCE COVERAGE

Life insurance	Percent choosing response I	II	III	IV	Number of responses	Mean risk tolerance[a]
Yes	66.1	11.6	10.5	11.6	8162	0.2353
No	61.0	11.5	11.7	15.7	3399	0.2548

The p-value for the hypothesis that mean risk tolerance does not differ according to whether or not the respondent has life insurance is 0.0001.

a. The mean risk tolerance is computed using the baseline parametric model.

to be insured than employees. Similarly, Table VII shows that individuals without life insurance are substantially more risk tolerant than those with it.

The results in the cross tabulations for health and life insurance carry over when the demographic factors are controlled for in the regressions reported in Table V. The most risk tolerant respondents are 8.2 percentage points more likely not to have health insurance and over six and one-half percentage points more likely to forgo life insurance than the least risk-tolerant respondents. Both results are highly statistically significant (t-statistics in excess of 5) and are quantitatively important.

Income and Wealth. Tables VIII and IX show risk tolerance by quintiles of income and wealth. Risk tolerance decreases with income and wealth until the middle of the distributions, and then increases. Note that the pattern of risk tolerance by income and wealth is similar to that for age. Risk tolerance rises at the high end of the wealth, income, and age distributions.[25]

Home equity is the major component of wealth for most individuals. The 20 percent of individuals who do not live in houses they own are substantially more risk tolerant than those who own their homes. The most risk-tolerant individuals are over 6 percent less likely to own homes than the least risk tolerant indi-

25. Older and high wealth individuals might interpret the survey questions differently from most respondents because labor income is a smaller fraction of their current resources. We checked for this possibility by grouping the responses by both age and wealth quintile. These groupings do not lead to the conclusion that the highly risk-tolerant respondents are either old or wealthy. Moreover, we reran the regressions in Table V including the logarithms of income and wealth as regressors. Controlling for income and wealth raises some coefficient of risk tolerance and lowers others, but overall has little qualitative impact on the findings. (We report the regressions without wealth and income in Table V, owing to concern about the endogeneity of those variables.)

TABLE X
DOES MEASURED RISK TOLERANCE PREDICT PORTFOLIO SHARES? REGRESSIONS OF PORTFOLIO SHARES ON RISK TOLERANCE AND DEMOGRAPHIC VARIABLES

Dependent variable: Portfolio share	Mean of dependent variable	Regression coefficients of risk tolerance: Primary (R1)	Regression coefficients of risk tolerance: Primary minus secondary (R1 − R2)	Standard error of estimate	R^2
Stocks	0.140	0.097	−0.023	0.244	0.060
		(0.029)	(0.027)		
Bonds	0.014	0.015	−0.010	0.068	0.040
		(0.008)	(0.008)		
Saving and checking	0.416	−0.128	0.018	0.348	0.153
		(0.041)	(0.039)		
Treasury bills	0.095	−0.055	0.050	0.201	0.013
		(0.024)	(0.022)		
IRA and Keogh	0.248	−0.006	0.020	0.312	0.033
		(0.037)	(0.035)		
Other assets	0.086	0.076	−0.056	0.215	0.017
		(0.025)	(0.024)		

The dependent variables are shares of assets in total financial wealth. The estimated regressions include demographic covariates (see note to Table VII) plus the logarithms of income and wealth. The third column reports the estimated coefficient of the primary respondent's (R1) relative risk tolerance. The fourth column gives that of the difference between the primary and secondary respondents' (R1 − R2) relative risk tolerance. Relative risk tolerance conditional on the survey responses is assigned to each respondent using the baseline statistical model. The regressions are based on 5012 households' responses.

one-sixth of the households. Since asset ownership depends substantially on income and wealth, we include these as controls in the regressions of portfolio variables.[26]

The questions about assets apply to the household. In the Health and Retirement Study, they are answered by the "knowledgeable respondent"—the member of the household with the best knowledge of the household's assets. The assets are characteristics of the household (there is no information on asset ownership within the household), while risk preference is a feature of individuals. Recall that the risk tolerance measure is positively, but not strongly, correlated within couples (Table II). To study the

26. Some of the portfolio shares are zero. Tobin's Separation Theorem implies, however, that they should all be positive. The zero shares may result from a fixed cost of holding a particular asset, which would imply jumps from zero to strictly positive portfolio shares.

- Open questions:

  - Are small-scale and large-scale risk aversion driven by same model?

  - Do they correlate?

- Best evidence of small-scale risk-aversion: Sydnor (2005) on home insurance

Economics 219B

The Deductible-Premium Puzzle

Justin Sydnor

March 16, 2005

Outline

- Industry Background
- Basics of the Dataset
- Main Results
- Discussion

Insurance Coverage Reported by U.S. Households: 1981-2001

Coverage/ Year	% Have Insurance	% Don't Have Insurance	Don't Know/ No Answer
Homeowners:			
1981	95%	1%	4%
1995	95%	4%	1%
1998	96%	4%	0%
2000	97%	3%	0%
2001	88%	8%	4%
Renters:			
1981	32%	61%	7%
1995	22%	75%	2%
1998	29%	69%	2%
2000	24%	75%	1%
2001	48%	46%	6%
Source: Insurance Research Council, III			

Causes of Homeowners Insurance Losses: 1996-2000

Cause of Loss	1996	1997	1998	1999	2000
Property Damage					
Fire, Lightning, Debris	26.9%	34.3%	28.4%	32.7%	35.1%
Wind and Hail	25.4%	16.9%	31.7%	24.1%	20.2%
Water Damage/Freezing	19.2%	17.8%	15.6%	19.9%	22.9%
Theft	5.6%	7.6%	5.7%	5.1%	5.0%
All Other	13.7%	11.7%	10.2%	10.5%	11.2%
Liability					
Bodily Injury/Property Damage	7.8%	9.3%	7.0%	6.2%	4.4%
Medical Payments & Other	1.3%	2.2%	1.2%	1.4%	1.4%
Credit Card & Other	0.1%	0.2%	0.1%	0.1%	0.0%

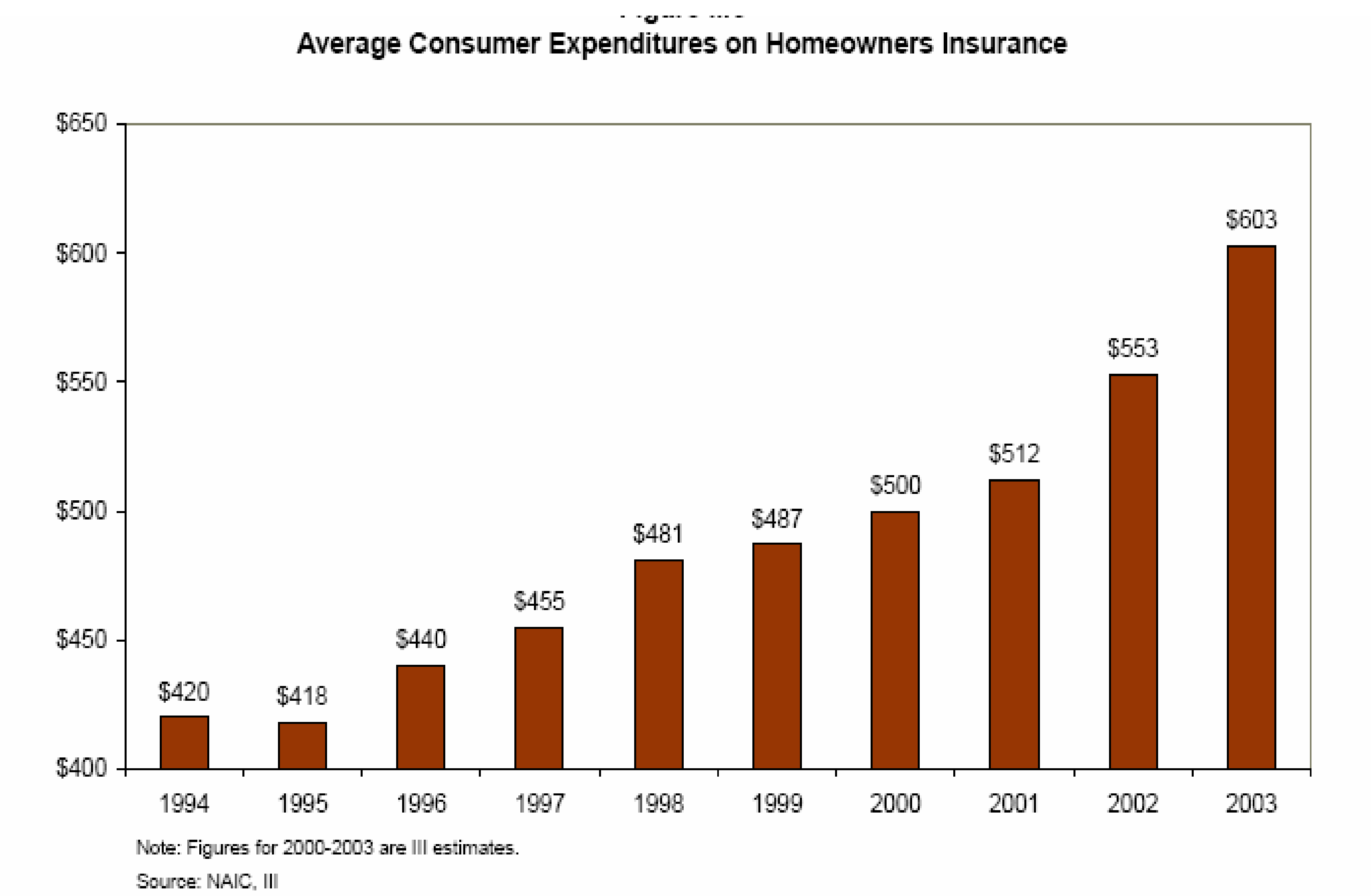
Source: Insurance Services Office, III

Homeowners Claim Frequency & Severity

Accident Year	Water Damage/Freezing		Total Losses	
	Claim Frequency*	Claim Severity	Claim Frequency*	Claim Severity
1996	2.89	$2,509	12.28	$3,071
1997	1.82	$2,618	8.51	$3,150
1998	1.93	$2,656	9.85	$3,342
1999	2.18	$2,984	8.63	$3,773
2000	2.18	$3,347	7.72	$4,168
Average	2.19	$2,828	9.34	$3,470

* Claims per 100 insured house-years.

Source: Insurance Services Office, III



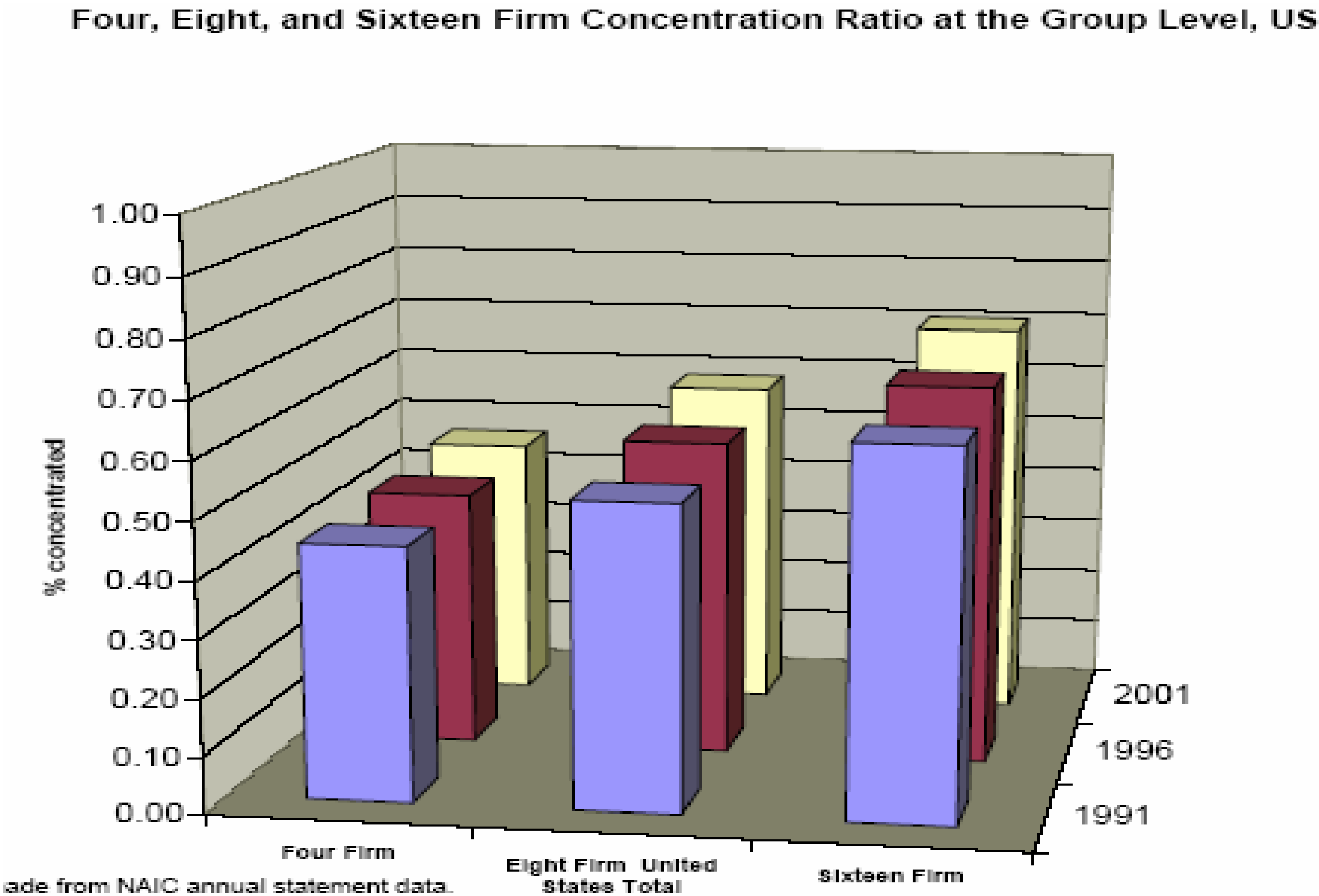
Premium for a typical home

Profitability: Homeowners Multiperil (Direct Basis)
Countrywide: 1990-2001

Year	DPE (000s)	Losses (000s)	Loss Ratio	Comb. Ratio*	Oper. Ratio*	Profit	ROE
1990	18,504,957	13,157,024	71.1%	113.0%	107.8%	-4.3%	-0.9%
1991	19,352,271	14,688,374	75.9%	117.7%	112.3%	-8.0%	-6.6%
1992	20,537,907	25,590,232	124.6%	158.4%	151.9%	-40.2%	-54.3%
1993	21,923,226	15,236,642	69.5%	113.6%	107.3%	-2.2%	2.5%
1994	23,600,467	16,921,535	71.7%	118.4%	113.5%	-4.4%	-1.7%
1995	24,944,550	16,762,738	67.2%	112.7%	107.4%	-1.2%	3.7%
1996	26,466,652	20,220,522	76.4%	121.7%	116.8%	-7.4%	-4.2%
1997	27,985,192	15,531,782	55.5%	101.0%	96.4%	5.4%	12.4%
1998	29,939,361	19,041,434	63.6%	109.4%	104.8%	-0.7%	5.4%
1999	31,564,464	20,106,564	63.7%	108.2%	103.8%	-0.1%	5.4%
2000	33,893,739	22,507,112	66.4%	111.4%	107.1%	-1.9%	3.8%
2001	36,061,805	27,839,713	77.2%	121.7%	118.4%	-10.0%	-7.2%
Avg.	26,231,216	18,966,973	73.6%	117.3%	112.3%	-6.3%	-3.5%

* From A.M. Best on net basis.

Source: NAIC and A.M. Best



ade from NAIC annual statement data.

CA – Market Shares in 2000

- State Farm: 22.2%
- Zurich: 19.6%
- Allstate: 15.4%
- CSAA: 5.1%
- USAA: 4.3%
- SAFECO: 3.4%
- California Department of Insurance: 2000 Property and Casualty Market Share Report.

Data

- 50,000 policies
- Snapshot of policy details at beginning and end of calendar year (Dec. 31st)
- Summary Stats

How the Deductible Affects Premium

Lower deductible $\Rightarrow$ Higher yearly premium

$(\text{Premium}_i \mid \text{Deductible}_i = D_j) = \delta_j * f(X_i) + g(X_i)$

- $f(X_i)$ – base premium
- δ_j -- deductible factor (.86 for $1000)
- $g(X_i)$ – additive adjustment (e.g. discounts)

EXAMPLES OF DEDUCTIBLE-PREMIUM MENU

- ***Policyholder 1***: Home was built in 1966 and had an insured value of $181,700. The average age of the household members was 64.5. The policyholder had coverage with the company for 5 years, and filed no claims in the three years prior to the sample year. The menu offered to this policyholder in the sample year was:

Deductible	Premium
100	$ 773
250	$ 661
500	$ 588
1000	$ 504

- ***Policyholder 2:*** Home was built in 1992 and had an insured value of $266,100. The average age of the household members was 53. The policyholder had coverage with the company for 4 years, and filed no claims in the three years prior to the sample year. The menu offered to this policyholder in the sample year was:

Deductible	Premium
100	$ 1,171
250	$ 999
500	$ 885
1000	$ 757

The Deductible as Additional Insurance

- Compare the \$250 to the \$500 deductible

- Value of \$250 relative to \$500:

$$= \int_{250}^{500} (L-250)\, p(L)\, dL + \int_{500}^{\infty} (500-250)\, p(L)\, dL < n*(500-250)$$

EX: n = .05 $\Rightarrow$ value at most \$12.50

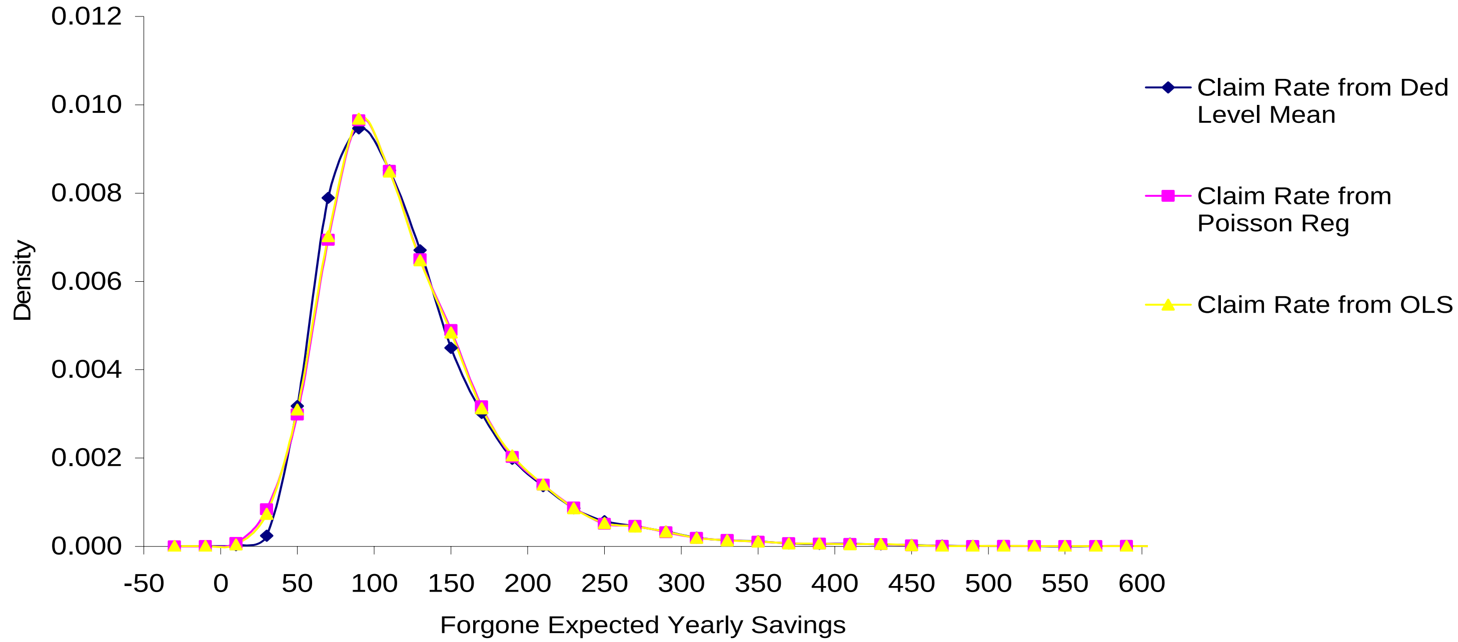
Table 2. Expected Value vs. Cost in Higher Premiums for Low Deductibles

		Yearly expected number of losses in excess of the deductible. (sample avg. by ded.)	Expected Value relative to the $500 deductible
Deductible		n_D	$n_D(500 - D)$
100	N = 149 (0.30%)	.047 (.212)	18.80
250	N = 17,536 (35.08%)	.049 (.234)	12.25
500	N = 23,782 (47.57%)	.043 (.217)	--
1000	N = 8,525 (17.05%)	.025 (.167)	-21.50
Sample	N = 49,992 (100%)	.042 (.216)	

Standard Deviations in Parentheses.

* This table shows the incremental expected value of a given deductible relative to either the $500 or $1000 deductibles. As discussed in Section 5 of the paper this is an upper bound on the relative value of the lower deductible. It also shows the average difference in premium paid by those with lower deductibles relative to what they would have paid had they held either the $500 or $1000 deductible. Comparing the two shows the difference between the cost of the lower deductible and its expected value.

Figure 1. Kernel Densities of Forgone Expected Savings
($250 Deductible relative to $1000) for Different Claim Rate Estimates



* The default halfwidth generated by STATA was used for these estimates. That halfwidth is 5.93 for the deductible specific claim rate, 6.00 for the Poisson regression claim rate, and 6.01 for the OLS regression claim rate.

What's the Puzzle?

- Like the Equity Premium Puzzle they are "too risk averse" to be EU(W) maximizing

- Basic idea is the Rabin Critique – they should be "virtually" risk neutral

Possible Explanations EU(W)

- EU(W) but not Rat-X:
  - Requires beliefs of Prob Loss bet 20-30%.
  - Possible Test: Ask for subjective estimate of loss probabilities and WTP for insurance
  - Learning? (People only switch up not down)

- Credit/Borrowing Constraints
  - Can't smooth consumption over time.
  - Don't smooth consumption over time.

Non-EU(W) Arguments

- Status Quo (coupled with Inflation?)

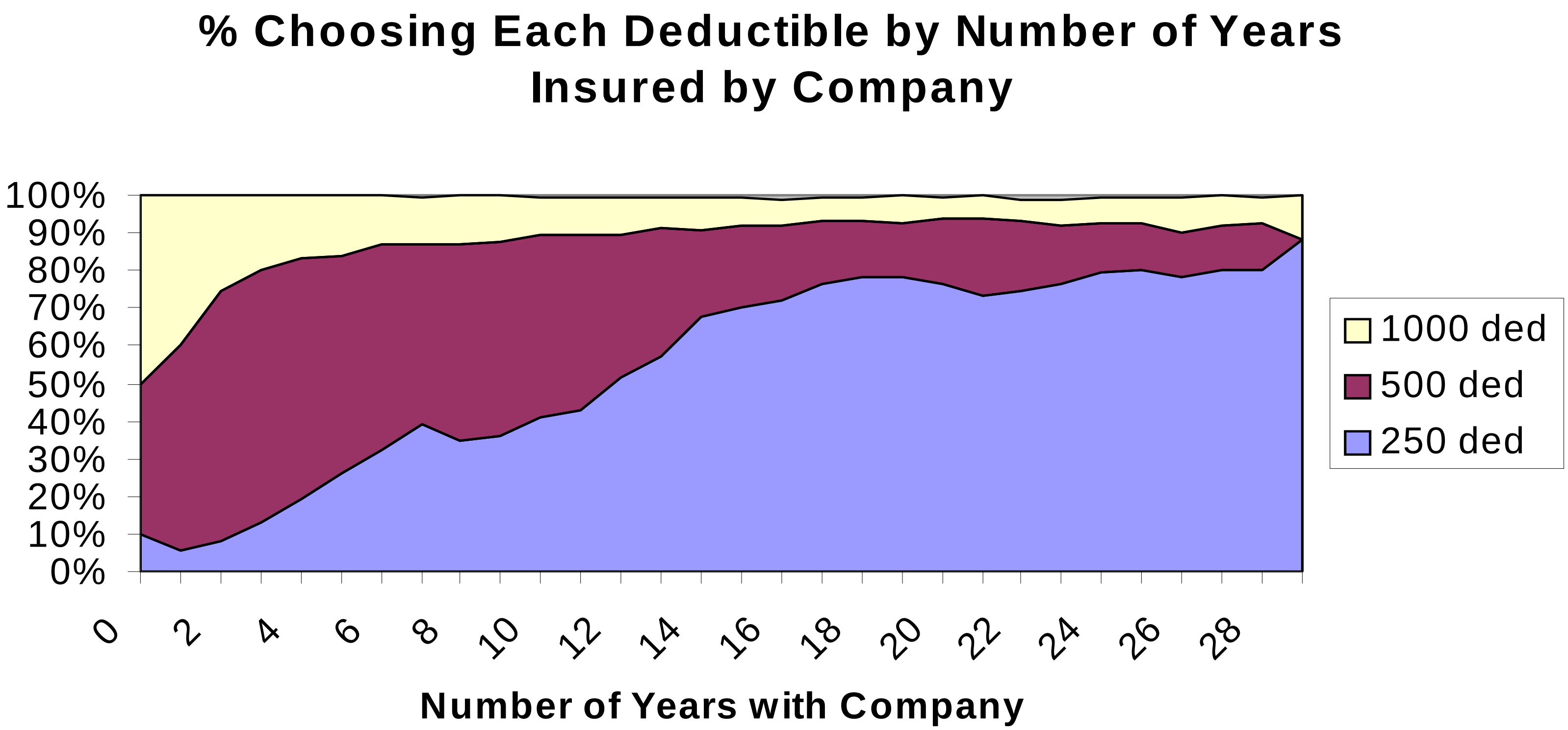


Table 6. Expected Value vs. Cost in Higher Premiums for Low Deductibles Adjusted for Inflation

		Yearly expected number of losses in excess of the deductible. (sample avg. by ded.)	Expected Value relative to the \$500 deductible	Average increase in yearly premium relative to the premium with a \$500 deductible	Expected Value relative to the \$1000 deductible	Average increase in yearly premium relative to the premium with a \$1000 deductible
Deductible		n_D	$n_D(500-D)$	$p_D - p_{500}$	$n_D(1000-D)$	$p_D - p_{1000}$
100	N = 149 (0.30%)	.047 (.212)	18.80	120.51 (58.35)	42.30	175.28 (84.88)
250	N = 17,536 (35.08%)	.049 (.234)	12.25	51.51 (23.10)	36.75	110.94 (49.76)
500	N = 23,782 (47.57%)	.043 (.217)	--	--	21.50	88.34 (36.24)
1000	N = 8,525 (17.05%)	.025 (.167)	-21.50	-118.70 (61.75)	--	--
Sample	N = 49,992 (100%)	.042 (.216)				

Standard Deviations in Parentheses.

* This table shows the incremental expected value of a given deductible relative to either the \$500 or \$1000 deductibles. As discussed in the paper this is an upper bound on the relative value of the lower deductible. It also shows the average difference in premium paid by those with lower deductibles relative to what they would have paid had they held either the \$500 or \$1000 deductible. Comparing the two shows the difference between the cost of the lower deductible and its expected value. This table is identical to Table 2 except that columns 3 & 5 have been adjusted for inflation in this table. Columns 3 & 5 in this table give the average premium differences individuals in a given deductible level face adjusted for inflation by how long they have been insured with the company. For example, for those who have been with the company for 10 years the premium differences are reduced by a little under 30% when adjusted for inflation.

Other Explanations

- Framing Effects – choosing the middle
    - Possible Test: Add a higher deductible option.
- Emotional Reasons:
    - Fear of Regret (salience, loss aversion)
        - Possible Test: Florida Hurricane victims.
    - Anxiety (thinking about causes of loss?)
        - Possible Test: Theft vs. Weather damage.
    - Feeling as though you are insuring the objects not the money (affection affect)

Table 2. Expected Value vs. Cost in Higher Premiums for Low Deductibles

		Yearly expected number of losses in excess of the deductible. (sample avg. by ded.)	Expected Value relative to the \$500 deductible	Average increase in yearly premium relative to the premium with a \$500 deductible	Expected Value relative to the \$1000 deductible	Average increase in yearly premium relative to the premium with a \$1000 deductible
Deductible		n_D	$n_D(500 - D)$	$p_D - p_{500}$	$n_D(1000 - D)$	$p_D - p_{1000}$
100	N = 149 (0.30%)	.047 (.212)	18.80	166.65 (56.77)	42.30	242.40 (82.57)
250	N = 17,536 (35.08%)	.049 (.234)	12.25	73.79 (27.48)	36.75	158.93 (59.19)
500	N = 23,782 (47.57%)	.043 (.217)	--	--	21.50	99.85 (40.65)
1000	N = 8,525 (17.05%)	.025 (.167)	-21.50	-130.89 (64.85)	--	--
Sample	N = 49,992 (100%)	.042 (.216)				

Standard Deviations in Parentheses.

* This table shows the incremental expected value of a given deductible relative to either the \$500 or \$1000 deductibles. As discussed in Section 5 of the paper this is an upper bound on the relative value of the lower deductible. It also shows the average difference in premium paid by those with lower deductibles relative to what they would have paid had they held either the \$500 or \$1000 deductible. Comparing the two shows the difference between the cost of the lower deductible and its expected value.

Table 1. Summary Statistics: Policy Variables

Variable	Full Sample	Deductible Level 100	250	500	1000
Insured Home Value[1]	206,917 (91,178)	164,485 (53,808)	180,895 (65,089)	205,026 (81,834)	266,461 (127,773)
Insured Personal Property Limit	142,711 (63,394)	113,890 (38,181)	124,448 (45,523)	142,008 (56,869)	182,740 (89,178)
Insured Liability Limit	435,384 (227,338)	307,383 (196,281)	321,715 (182,788)	471,205 (207,053)	571,507 (255,394)
Average Age of HH members	53.7 (15.8)	66.6 (15.5)	59.8 (15.9)	50.5 (14.9)	50.1 (14.5)
Year Home Built	1970 (20.1)	1962 (15.2)	1966 (17.6)	1973 (20.3)	1972 (22.9)
Number of Claims in Sample Year	.042 (.216)	.047 (.212)	.049 (.234)	.043 (.217)	.025 (.167)
Yearly Premium	719.80 (312.76)	709.78 (269.34)	687.19 (267.82)	715.6 (300.39)	798.6 (405.78)
Losses per Claim net of Deductible	5,571.53 (21,022.20)	2,679.50 (4,584.58)	4,496.38 (16,298.04)	6,227.63 (25,234.58)	6,880.77 (15,583)
Number of Years Insured by Company	8.4 (7.1)	13.2 (6.7)	13.5 (7.0)	5.8 (5.2)	5.1 (5.6)
Index of Prior Losses[2]	.071 (.295)	.101 (.344)	.087 (.321)	.068 (.293)	.045 (.239)
N Percent of Sample	49,992 100%	149 0.30%	17,536 35.08%	23,782 47.57%	8,525 17.05%

Note: The table reports means for each variable with standard deviations in parentheses.

[1] Insured Home Value is the value of the structure of the home (the cost of rebuilding). Insured Personal Property Limit is the value of the goods inside the home (electronics, furniture, etc…). Insured Liability Limit is the limit of the insurance to cover liability claims relating to a customer's home (e.g. a fire in the house spreads to neighboring property)

[2] The index of prior losses covers the three years prior to the sample year. Any losses over $1000 to the company (that is over claims of at least $1000 over the deductible) in the prior three years are given 1 point. In addition certain types of these claims are given 2 points instead of 1. The types of claims incurring this double point policy are unknown to me, but may include water damage claims.

Average Homeowners Insurance Premiums
HO3 Policy: Policy Limit $175,000-$200,000

State	1996	1998	1999	Pct. Chg.
Alabama	$738	$748	$755	2.3%
Alaska	$685	$684	$668	-2.5%
Arizona	$514	$514	$503	-2.1%
Arkansas	$756	$755	$776	2.6%
California	$568	$592	$582	2.5%
Colorado	$647	$663	$662	2.3%
Connecticut	$539	$564	$558	3.5%
Delaware	$382	$380	$377	-1.3%
District of Columbia	$596	$603	$587	-1.5%
Florida	$894	$944	$934	4.5%
Georgia	$525	$544	$536	2.1%
Hawaii	$624	$497	$508	-18.6%
Idaho	$462	$461	$446	-3.5%
Illinois	$377	$443	$414	9.8%
Indiana	$472	$474	$457	-3.2%
Iowa	$525	$508	$492	-6.3%
Kansas	$794	$824	$815	2.6%
Kentucky	$490	$511	$525	7.1%
Louisiana	$1,032	$1,014	$1,040	0.8%
Maine	$509	$509	$487	-4.3%
Maryland	$390	$419	$414	6.2%
Massachusetts	$616	$600	$588	-4.5%
Michigan	$514	$510	$509	-1.0%
Minnesota	$504	$493	$483	-4.2%
Mississippi	$908	$869	$849	-6.5%
Missouri	$583	$586	$569	-2.4%
Montana	$641	$599	$595	-7.2%
Nebraska	$624	$663	$668	7.1%
Nevada	$585	$563	$552	-5.6%
New Hampshire	$576	$566	$548	-4.9%
New Jersey	$475	$499	$492	3.6%
New Mexico	$653	$638	$602	-7.8%
New York	$562	$574	$568	1.1%
North Carolina	$489	$515	$520	6.3%
North Dakota	$543	$583	$590	8.7%
Ohio	$382	$393	$392	2.6%
Oklahoma	$956	$980	$951	-0.5%
Oregon	$411	$400	$394	-4.1%
Pennsylvania	$516	$528	$520	0.8%
Rhode Island	$669	$667	$658	-1.6%
South Carolina	$734	$732	$714	-2.7%
South Dakota	$550	$554	$562	2.2%
Tennessee	$594	$614	$612	3.0%
Texas	$1,202	$1,251	$1,175	-2.2%
Utah	$479	$477	$476	-0.6%
Vermont	$592	$570	$542	-8.4%
Virginia	$341	$371	$373	9.4%
Washington	$473	$470	$463	-2.1%
West Virginia	$528	$542	$544	3.0%
Wisconsin	$370	$358	$346	-6.5%
Wyoming	$712	$700	$688	-3.4%
Countrywide	$559	$578	$567	1.4%
Source: National Association of Insurance Commissioners				

*
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3 Framing: Coherent Arbitrariness

Slides borrowed from Yesim

Stable Demand Curves w/o Stable Preferences

- Initial choices highly sensitive to anchors/framing
- Initial choice will have an inappropriate influence on following choices
- Individuals respond coherently to *changes*

Coherent Arbitrariness

- People have fuzzy WTP (a range of values)
- They arbitrarily pick one price-initial choices provide framing for subsequent choices
    - Authors elicit arbitrariness with anchoring, but what are the real world reasons to pick one price over another, is it totally random? Self-enhancing market equilibrium?

Experiment 1

- Anchor with SSN
- Subjects with above-median SSN state higher prices
- Conclusions:
  - Subjects did not have or could not remember their absolute valuations for these products
  - They had a relative ordering (pay more for keyboard than for mouse)

TABLE I
AVERAGE STATED WILLINGNESS-TO-PAY SORTED BY QUINTILE OF THE SAMPLE'S SOCIAL SECURITY NUMBER DISTRIBUTION

Quintile of SS# distribution	Cordless trackball	Cordless keyboard	Average wine	Rare wine	Design book	Belgian chocolates
1	\$ 8.64	\$16.09	\$ 8.64	\$11.73	\$12.82	\$ 9.55
2	\$11.82	\$26.82	\$14.45	\$22.45	\$16.18	\$10.64
3	\$13.45	\$29.27	\$12.55	\$18.09	\$15.82	\$12.45
4	\$21.18	\$34.55	\$15.45	\$24.55	\$19.27	\$13.27
5	\$26.18	\$55.64	\$27.91	\$37.55	\$30.00	\$20.64
Correlations	.415	.516	0.328	.328	0.319	.419
	$p = .0015$	$p < .0001$	$p = .014$	$p = .0153$	$p = .0172$	$p = .0013$

The last row indicates the correlations between Social Security numbers and WTP (and their significance levels).

consumer products. The first class meeting of a market research course in the Sloan School MBA program provided the setting for the study. Fifty-five students were shown six products (computer accessories, wine bottles, luxury chocolates, and books), which were briefly described without mentioning market price. The average retail price of the items was about \$70. After introducing the products, subjects were asked whether they would buy each good for a dollar figure equal to the last two digits of their social security number. After this Accept/Reject response, they stated their dollar maximum willingness-to-pay (WTP) for the product. A random device determined whether the product would in fact be sold on the basis of the first, Accept/Reject response, or the second, WTP response (via the incentive-compatible Becker-Degroot-Marschak procedure [1963]). Subjects understood that both their Accept/Reject response and their WTP response had some chance of being decisive for the purchase, and that they were eligible to purchase at most one product.

In spite of the realism of the products and transaction, the impact of the social security number on stated WTP was significant in every product category. Subjects with above-median social security numbers stated values from 57 percent to 107 percent greater than did subjects with below-median numbers. The effect is even more striking when examining the valuations by quintiles of the social security number distribution, as shown in Table I. The valuations of the top quintile subjects were typically greater by a factor of *three*. For example, subjects with social security

Experiment 2

- Anchor 30 sec noise with 10 or 50 cents, or no anchor
- 3 sets of 10-30-60 sec noise (increasing/decreasing)
- Conclusions
    - WTA for annoying sound also susceptible to anchoring manipulation
    - Experience with the product does not eliminate bias- no convergence in 9 periods
    - Coherence with respect to duration-mean price of 10<mean price of 30<mean price of 60. Ratios of WTA are the same across different anchoring conditions
- People get relative ordering right. Scale is arbitrary.
- Maybe did not have the time to learn the distribution of computer prices, and saw the anchor as informative.

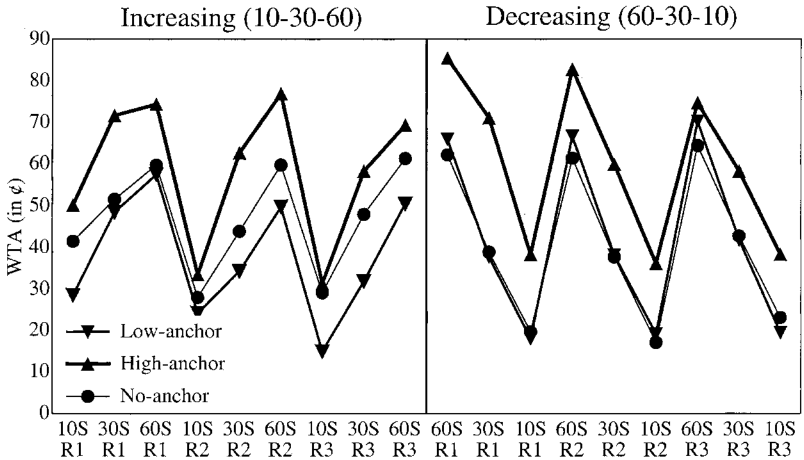

FIGURE I

Mean WTA for the Nine Trials in the Three Anchor Conditions

The panel on the left shows the increasing condition (duration order of 10, 30, and 60 seconds). The panel on the right shows the decreasing condition (duration order of 60, 30, and 10 seconds).

price for the 30 second sound [$M = 48.69$; $F(1,252) = 169.46$, $p < 0.001$], and the mean price for the 30 second sound was lower than the mean price for the 60 second sound [$M = 66.25$; $F(1,252) = 126.06$, $p < 0.001$].

Figure I provides a graphical illustration of the results thus far. First, the vertical displacement between the lines shows the powerful effect of the anchoring manipulation. Second, despite the arbitrariness revealed by the effect of the anchoring manipulation, there is a strong and almost linear relationship between WTA and duration. Finally, there is no evidence of convergence between the different conditions across the nine trials.

Figure II provides additional support for the tight connection between WTA and duration. For each subject, we calculated the ratio of WTA in each of the durations to each of the other durations, and plotted these separately for the three conditions. As can be seen in the figure, the ratios of WTAs are stable, and independent of condition (there are no significant differences by condition).

In summary, Experiment 2 demonstrates arbitrary but coherent pricing of painful experiences, even when there is no uncertainty about the nature or duration of the experience. Nei-

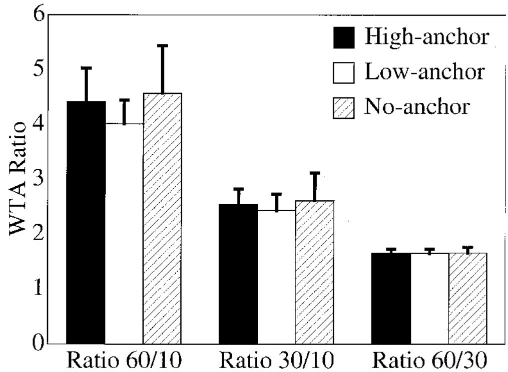

FIGURE II
Mean of Individual WTA Ratios for the Different Durations across the Different Conditions
Error bars are based on standard errors.

ther repeated experience with the event, nor confrontation with the same price distribution, overrode the impact of the initial anchor.

V. EXPERIMENT 3: RAISING THE STAKES

Experiment 3 was designed to address two possible objections to the previous procedure. First, it could be argued that subjects might have somehow believed that the anchor was informative, even though they had experienced the sound for themselves. For example, they might have thought that the sound posed some small risk to their hearing, and might have believed that the anchor roughly corresponded to the monetary value of this risk. To eliminate this possibility, Experiment 3 used subjects' own social security numbers as anchors. Second, one might be concerned that the small stakes in the previous experiment provided minimal incentives for accurate responding, which may have increased the arbitrariness of subjects' responses and their sensitivity to the anchor. Experiment 3, therefore, raised the stakes by a factor of ten. In addition, at the end of the experiment, we added a question designed to test whether the anchor-induced changes in valuation carry over to trade-offs involving other experiences.

Ninety students from the Massachusetts Institute of Tech-

Experiment 3

- Instead of cents, use SSN to anchor 300 sec
- Raise stakes(100,300,600 seconds) - large enough?
- Same results, more demonstration:
  - People who are in the increasing order condition submit higher WTA for the middle option (300 sec for both groups) than the decreasing order condition

Rank ordering of annoyance of the sound (compared to other annoying things in life) is not affected by initial anchoring.

- Need another experiment that asks about WTA for other annoying things in life after anchoring for noise price.

TABLE II

	The event	Mean rank
1	Missing your bus by a few seconds	4.3
2	Experiencing 300 seconds of the same sound you experienced	5.1
3	Discovering you purchased a spoiled carton of milk	5.2
4	Forgetting to return a video and having to pay a fine	5.4
5	Experiencing a blackout for an hour	5.8
6	Having a blood test	6.0
7	Having your ice cream fall on the floor	6.0
8	Having to wait 30 minutes in line for your favorite restaurant	6.2
9	Going to a movie theater and having to watch it from the second row	6.7
10	Losing your phone bill and having to call to get another copy	7.3
11	Running out of toothpaste at night	8.1

The different events that subjects were asked to order-rank in terms of their annoyance, at the end of Experiment 3. The items are ordered by their overall mean ranked annoyance from the most annoying (lower numbers) to the least annoying (high numbers).

but significant interaction between anchor and duration [$F(2,176) = 4.17$, $p = 0.017$].

If subjects have little idea about how to price the sounds initially, and hence rely on the random anchor in coming up with

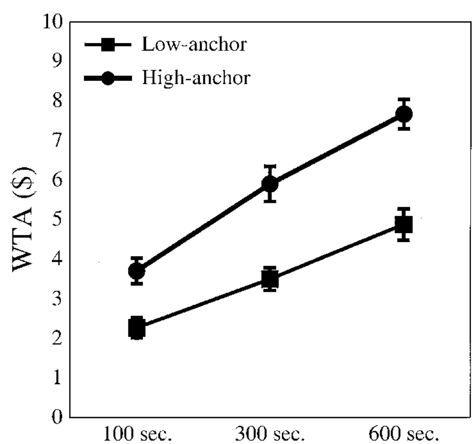

FIGURE III
Mean WTA (in Dollars) for the Three Annoying Sounds

The data are plotted separately for subjects whose three-digit anchor was below the median (low anchor) and above the median (high anchor). Error bars are based on standard errors.

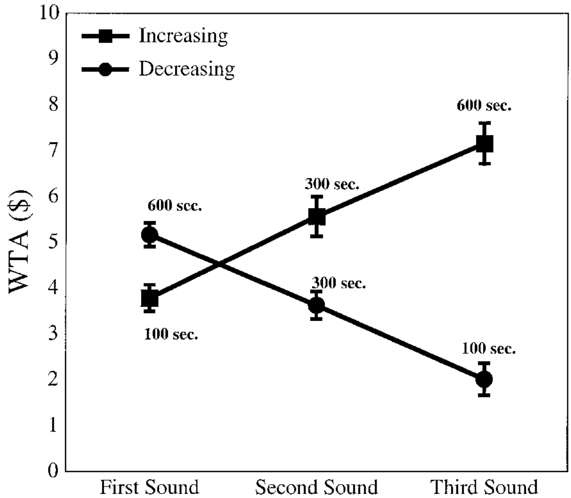

FIGURE IV

Mean WTA (in Dollars) for the Three Annoying Sounds

The data are plotted separately for the increasing (100 seconds, 300 seconds, 600 seconds) and the decreasing (600 seconds, 300 seconds, 100 seconds) conditions. Error bars are based on standard errors.

a value, we would expect responses to the initial question to be relatively close to the anchor, regardless of whether the duration was 100 seconds or 600 seconds. However, having committed themselves to a particular value for the initial sound, we would expect the increasing duration group to then adjust their values upward while the decreasing group should adjust their anchor downward. This would create a much larger discrepancy between the two groups' valuations of the final sound than existed for the initial sound. Figure IV shows that the prediction is supported. Initial valuations of the 600 second tone in the decreasing order condition [M = \$5.16] were significantly larger than initial valuations of the 100 second tone in the increasing order condition [M = \$3.78; $t(88) = 3.1$, $p < .01$], but the difference of \$1.38 is not very large. In the second period, both groups evaluated the same 300 second tone, and the valuation in the increasing condition was greater than that of the decreasing condition [Ms = \$5.56, and \$3.65; $t(88) = 3.5$, $p < .001$]. By the final period, the two conditions diverged dramatically with WTA being much higher in the increasing condition compared with the de-

Experiment 4 (very unclear)

- Tries to see if market forces would decrease anchoring bias
- Simulates market with auctions
- Why convergence of prices within a specific market?
- Use cents to anchor-information?
- Low/High anchor manipulated between subjects, not groups
- No convergence between hi vs. low anchored people
- Convergence within group (group arbitrary value??)
- Conclude that market forces can strengthen impact of anchoring (Think about real world)

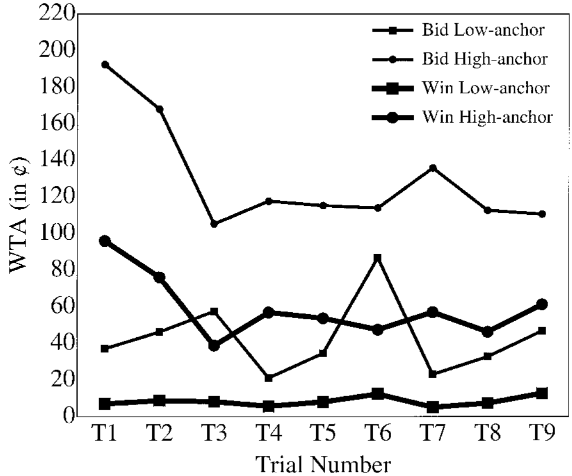

FIGURE V
Mean Bids (WTA) and Mean Payment as a Function of Trial and the Two Anchor Conditions

ended the subjects who "won" the sound received the amount set by the fourth lowest bid.

Results. The general findings paralleled those from the previous experiments. In the low-anchor condition, the average bids were 24¢, 38¢, and 67¢ for the 10, 30, and 60 second sounds, respectively (all differences between sound durations are significant within a condition), and in the high-anchor condition, the corresponding average bids were 47¢, \$1.32, and \$2.11. Overall, mean WTA in the low-anchor condition was significantly lower than WTA in the high-anchor condition [$F(1,49) = 20.38$, $p < 0.001$]. The difference in the amount of money earned by subjects in the two conditions was quite stunning: the mean payment per sound in the high-anchor condition was \$.59, while the mean payment in the low-anchor condition was only \$.08.

The main question that Experiment 4 was designed to address is whether the WTA prices for the low and high anchor conditions would converge over time. As can be seen from Figure V, there is no evidence of convergence, whether one looks at mean bids or the mean of the prices that emerged from the auction.

Although the bids and auction prices in the different conditions did not converge to a common value, bids *within* each group

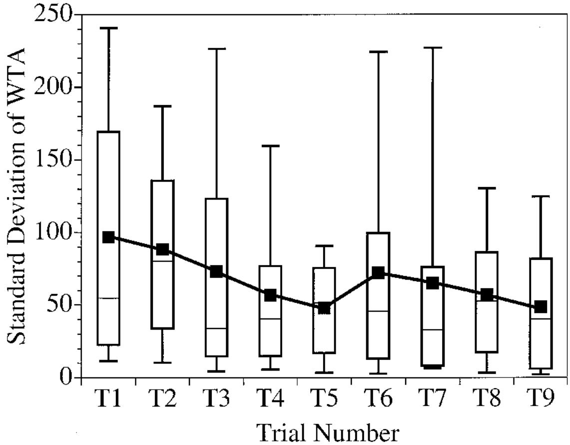

FIGURE VI
The within-Group Standard Deviations of the Bids (WTA), Plotted as a Function of Trial

did converge toward that group's arbitrary value. Figure VI, which plots the mean standard deviation of bids in the eight different markets for each of the nine trials, provides visual support for such convergence. To test whether convergence was significant, we first estimated the linear trend in standard deviations across the nine rounds separately for each group. Only one of the eight within-group trends was positive (0.25), and the rest were negative (ranging from -0.76 to -14.89). A two-tailed t-test of these eight estimates showed that they were significantly negative [$t(7) = 2.44$, $p < 0.05$].

In summary, Experiment 4 demonstrates that coherent arbitrariness is robust to market forces. Indeed, by exposing people to others who were exposed to the same arbitrary influences, markets can strengthen the impact of arbitrary stimuli, such as anchors, on valuation.

VII. EXPERIMENT 5: THE IMPACT OF MULTIPLE ANCHORS

According to our account of preference formation, the very first valuation in a given domain has an arbitrary component that makes it vulnerable to anchoring and similar manipulations. However, once individuals express these somewhat arbitrary values, they later behave in a fashion that is consistent with them,

Experiment 5

- 3 types of sound, with different anchors. Control for order of anchors.
- Tests their hypothesis of imprinting: initial choices influence subsequent choices
- They find that initial anchor matters most. Primacy effect. Is this a carry over from the first stated WTA or first anchor? Will this primacy effect hold against forgetting in real world? Maybe recency more important in real settings.

Experiment 6

- Maybe people are not used to pricing their pain, so let them trade experiences. (They could have used the base experience as something people are very used to, like candy bars)
- Not money trade, but experience trade (Gatorade+Vinegar vs. noise)
- Would you prefer middle size drink or X seconds of noise? (Anchoring works even after subjects experience both!! Can they really assess? Interesting goods..)
- People can “learn” preferences from market equilibria!
- Trade-offs are also fuzzy! Doesn’t this contradict type of coherence in the 1st experiment? Can we frame coherence too?
- Other work: When preferences are framed as trading, everything works like a money market

The Bite of the Paper

- Claim that choices do not reveal true preferences
  - Examine the choice setting where preferences are fuzzy
  - How important are the cases where there are no exact preferences? How general?
  - Do choices reveal ordering? Do we care about the absolutes?
- People will respond to changes (or comparisons), not the absolute levels. This has big implications for competition and policy making.

Curiosities

- Are people only coherent with different quantities of same good, or in their tradeoffs across goods? (exp1 vs. exp 6)
- Do they present enough support for imprinting, market forces and higher stakes?
- How about goods we have experience with?
- How big is the range of WTP that supports arbitrariness, and does it matter economically?
- How is this paper different than other work in framing and context-dependent preferences?

Coherent arbitrariness in the wild

- A wealthy man earns $100 more than his wife's sister's husband ☺
- Crime responds to publicized changes in deterrence levels, not so much to absolute levels of deterrence (Hsee- dictionary experiment- More on framing, menu dependence)

Some More Questions

- Is it earlier choices or market information that anchor us?
- Once anchor one good’s price all the rest gets adjusted. For this paper to matter, should people frame good comparisons narrowly? Or should the goods always be hard to evaluate even after experience?
- Fair price construct?
- Evidence of transitivity is explained by consumers remembering all the previous choices. How does imprinting extend to real world of forgetting?

1. When does this occur?

   - unfamiliar product

   - purchases temporally close to each other or salient (memory)

   - Could occur with unfamiliar tradeoffs: purchase expensive house or save more for retirement?

2. Psychological components:

   - People evalutate changes, not levels

   - Context matters (framing), comparison to other alternative, to market price

   - (Trick here: find instrument for context)

   - Subjects need to think that anchor can be the answer

   - Not enough to write down SS number

   - Need to ask: "Is you WTP higher than SS no.?"

3. Uncertainty about what?

- Uncertainty about quality of good

- Anchor works as signal

- (Does not work for social security number)

4. Where is budget constaint?

- In experiment no alternative use of money
- Value of \$1?

- Variant of experiment:
  - ask people to write down uses of \$1
  - best alternative activity
  - Prediction: get less effect of anchor
  - (Lagrangean)

3.1 Housing markets

- Loewenstein-Simonsohn, 2002

- Individual A moves from Boston to Pittsburgh

- Individual B moves from Phoenix to Pittsburgh

- Who pays more for housing?

- Depends on previous anchor

- Issues with unobseved heterogeneity

Table 3

Housing Demand Estimations for Renters

Dependent Variable: log(dollar amount of monthly rent)

	(1) Baseline	(2) Adds Costs in Previous City	(3) Adds Selection Adjustment	(4) Adds Fixed Effects	(5) Adds Relative Expenditure (t-1)	(6) Adds e(t-1)	(7) Excludes Housing Motivated Moves
constant	-0.631	-1.621	-1.376	-1.466	-1.260	-0.757	-1.853
	(0.606)	(0.697)	(0.705)	(0.712)	(0.908)	(1.223)	(0.785)
log(income)	0.284	0.284	0.252	0.254	0.248	0.232	0.294
	(0.029)	(0.029)	(0.030)	(0.030)	(0.045)	(0.074)	(0.039)
Number of children in household	0.044	0.045	0.040	0.040	0.053	0.062	0.056
	(0.017)	(0.017)	(0.017)	(0.018)	(0.020)	(0.021)	(0.018)
Number of adults in household	0.145	0.146	0.125	0.126	0.139	0.149	0.123
	(0.044)	(0.044)	(0.044)	(0.043)	(0.055)	(0.054)	(0.048)
Age of head of household	0.006	0.004	-0.001	0.001	0.006	0.003	0.000
	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.010)	(0.009)
(Age squared)/100	-0.003	-0.002	0.001	-0.001	-0.680	-0.003	0.000
	(0.007)	(0.007)	(0.007)	(0.007)	(0.011)	(0.010)	(0.000)
Attended college (1 or 0)	0.131	0.132	0.116	0.119	0.108	0.137	0.117
	(0.036)	(0.036)	(0.036)	(0.036)	(0.042)	(0.041)	(0.039)
Head of household is female (1 or 0)	0.026	0.021	0.036	0.034	0.093	0.111	0.053
	(0.048)	(0.047)	(0.048)	(0.049)	(0.053)	(0.062)	(0.051)
log(median rent destination city)	0.536	0.494	0.527	0.537	0.421	0.427	0.550
	(0.083)	(0.087)	(0.085)	(0.085)	(0.097)	(0.103)	(0.093)
log(median rent origin city)	--	0.203	0.197	0.192	0.286	0.209	0.182
	--	(0.079)	(0.079)	(0.080)	(0.096)	(0.101)	(0.089)
Inverse of Mill's Ration	--	--	0.198	0.187	-0.046	0.214	0.089
	--	--	(0.061)	(0.076)	(0.219)	(0.263)	(0.080)
Rent to Median Ratio in t-1	--	--	--	--	0.188	--	--
	--	--	--	--	(0.045)	--	--
Residual from t-1	--	--	--	--	--	0.136	--
	--	--	--	--	--	(0.051)	--
Yearly Fixed Effects	no	no	no	yes	yes	yes	yes
Number of observations	646	646	646	646	461	461	490
R-square	29.88%	30.64%	31.55%	32.20%	34.67%	34.65%	35.09%

notes: Robust standard errors are presented below parameter estimates in parenthesis.

Table 4

Readjustment of Consumption on Year Following Inter-city Move

	(1)	(2)	(3)
Dependent Variable:	*Dlog(rent[t+1])*	*Dlog(rent[t+1])*	*Dlog(rent[t+1])*
	Baseline	Adds (P*-P)	Adds year fixed effects
Intercept	0.072	0.057	0.101
	(0.040)	(0.040)	(0.101)
Change in log(income)	0.199	0.170	0.157
	(0.075)	(0.076)	(0.081)
Change in # of Adults	0.206	0.231	0.253
	(0.140)	(0.140)	(0.144)
Change in # of Children	0.047	0.064	0.059
	(0.071)	(0.072)	(0.073)
log (median rent t) - log (median rent (t-1))	--	0.287	0.286
	--	(0.163)	(0.171)
Number of Observations	140	140	140
Year Fixed Effects	no	no	yes
R-square	9.50%	11.54%	12.87%

notes: Robust standard errors are presented below parameter estimates in parenthesis.

3.2 Other markets

- Marketing: sales, advertising

- Compensation:
  - Across jobs: Executives (\$150k senator, \$10m CEO)
  - Homogeneity within area, differences across areas if local comparisons

- Under perfect competition:
  - prices driven to marginal cost
  - coherent arbitrariness afffects quantities purchased

4 Framing: Environmental Valuations

- Kahneman, Ritov, Schkade.

- Series of facts:

- *insensitivity to levels* (between-subjects)

  - WTP for saving 2,000 (20,000 or 200,000) migrating birds?

  - \$80 (\$78, \$88)

  - WTP to protect 57 wilderness areas vs. one area

  - 28% more

- Reflects flakiness of preferences

- Completely different if run within-subject

- *context effects* (within subjects)
  - Rate importance of problem and satisfaction from contributing to solve:
    - Coral reef problems
    - Multiple myeloma among elderly

	Import.		Moral sat.	
	CR first	M First	CR first	M First
CR	3.54	3.24	3.78	3.62
M	4.18	2.84	4.26	3.24

	WTP	
	CR first	M First
CR	$45	$69
M	$109	$59

- First evaluation reflects best guess given flaky preferences

- Second evaluation reflects rationalization given first evaluation

- *preference reversal* between vs. within
  - Kahneman, Schkade and Sunstein (1998)
  - 114 subjects decide on punitive damages
  - Background:
    * Child hurt beacause of flaw ($500,000 personal injury)
    * Business fraud ($10,000,000 personal injury)

	Punitive damage award	
	Between treatment	Within treatment
Child	$2,000,000	$2,500,000
Business	$5,000,000	$500,000

- Between: anchoring on personal injury amounts

- Within: Rational part of bran shouts: "Human life first!"

- *anchoring effects* (between-subjects)
  - As in coherent arbitrariness paper effect of SSN on answer to questions

- Flaky preferences: use anchor

- Issues:
  - Where is the budget set? Quite hard to make this realistic
  - Emotional reaction in immediate response
- Implications:
  - elicitation of environmental preferences?
  - scope for lobbies and politicians to manipulate preferences