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

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Outline

1. Loss Aversion and Housing

2. Five Applications of Reference Dependence

3. Loss Aversion and Experience

4. Framing: Coherent Arbitrariness

5. Framing: Environmental Evaluations

1 Loss Aversion and Housing

- Steven

Loss Aversion And Seller Behavior: Evidence from the Housing Market

David Genesove
Christopher Mayer
QJE November 2001

Presented by
Steven Huff

Economics 219 B Presentation

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Issue at Hand

- Housing market: Big cycles
  - Boston: 170% rise, then 40% drop…
  - Positive corr. in prices and sales
  - Large inventories and overpricing in a bust suggests sellers unwilling to accept market prices in a down cycle
  - Equity constraints? Loss Aversion?

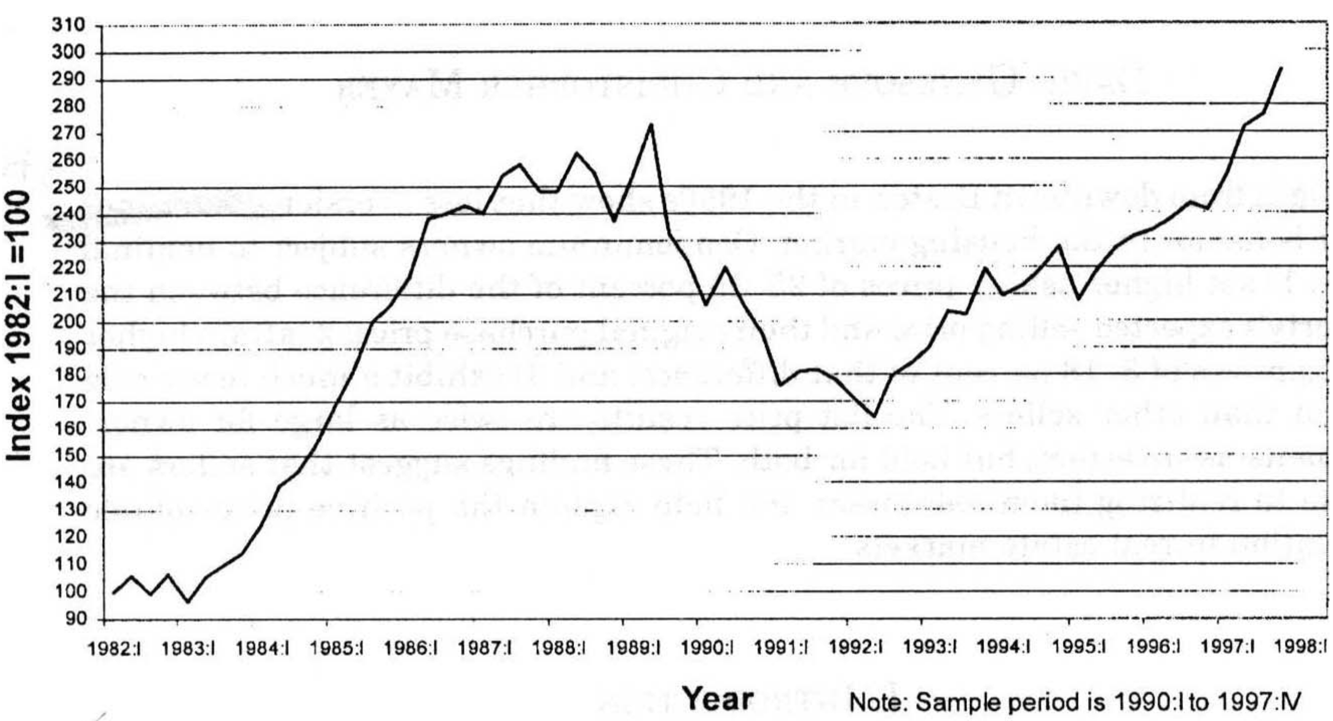


FIGURE I
Boston Condominium Price Index

Literature Review

- Tversky and Kahneman 1991
  - Three essential elements of value function from prospect theory
    - Reference points, function steeper for losses, diminishing marginal returns
- Shefrin and Statman (1985) and Odean (1998)
  - Examines choice of whether to sell in context of prospect theory
    - Traders hold losers longer than winners, even when losers have lower subsequent expected gain
- Odean (1998)
  - Traders more likely to sell nominal winners than losers

General Comments on Models

- Model use nominal prices
  - why?
- Reference point: original purchase price (nominal)
  - Is this the right choice?
- Reservation price changes inferred by looking at:
  - List price at entry
  - Transaction price
  - Time on market
- Models will look at losses (not gains)

Ideal Model

$$L_{ist} = \alpha_0 + \alpha_1 \mu_{it} + mLOSS^*_{ist} + \varepsilon_{it}$$

- L = log asking price
- i = unit
- s = quarter of the previous sale
- t = quarter of the original listing
- μ = expected log selling price
- LOSS = loss effect

$$\mu_{it} = X_i \beta + \delta_t + v_i$$

- X = *observables*
- δ = quarter of listing
- v = unobservables of unit (no t)

$$LOSS^*_{ist} = (P^0_{is} - \mu_{it})^+$$

- P = previous log selling price

$x^+ \equiv \max(0, x)$ Gains ignored

$$L_{ist} = \alpha_0 + \alpha_1 X_i \beta + \alpha_1 \delta_t + m(\delta_s - \delta_t + w_{is})^+ + \alpha_1 v_i + \varepsilon_{it}$$

- w = difference between previous selling and its expected value (i.e. owner's original over/under payment)

Model I (Upper Bound)

$$L_{ist} = \alpha_0 + \alpha_1 X_i \beta + \alpha_1 \delta_t + m(\delta_s - \delta_t + w_{is})^+ + \alpha_1 v_i + \varepsilon_{it}$$

$$L_{ist} = \alpha_0 + \alpha_1 (X_i \beta + \delta_t) + mLOSS_{ist} + \eta_{it}$$

$$LOSS_{ist} = (P_{is}^0 - X_i \beta + \delta_t)^+ = (\delta_s - \delta_t + v_i + w_{is})^+$$

$$\eta_{it} = \alpha_1 v_i + m((\delta_s - \delta_t + w_{is})^+ - (\delta_s - \delta_t + v_i + w_{is})^+) + \varepsilon_{it}$$

- Ideal (1st line) not reachable since *v* and *w* are not observed
- Model I (2nd line) includes noisy measure for loss (*v* now in the loss term); this produces an upper bound
- The new error term (4th line) shows two potential biases for Model I:
  - Simultaneous occurrence of *v*
  - Errors in variables bias

Model II (Lower Bound)

$$L_{ist} = \alpha_0 + \alpha_1 X_i \beta + \alpha_1 \delta_t + m(\delta_s - \delta_t + w_{is})^+ + \alpha_1 v_i + \varepsilon_{it}$$

$$L_{ist} = \alpha_0 + \alpha_1 (X_i \beta + \delta_t) + \alpha_1 (v_i + w_{is}) + mLOSS_{ist} + u_{it}$$

$$u_{it} = -\alpha_1 w_{is} + m((\delta_s - \delta_t + w_{is})^+ - (\delta_s - \delta_t + v_i + w_{is})^+) + \varepsilon_{it}$$

- Ideal (1st line)
- Model II (2nd line) includes noisy measure (*v* + *w)* for unobserved quality
- New error term (3rd line) shows two potential biases:
  - Again, there is measurement error (under the null) which biases downward (shown in simulation)
  - Unobserved quality bias replaced by first term of 3rd line which biases downward (shown again by simulation)

TABLE I
SAMPLE MEANS (STANDARD DEVIATIONS IN PARENTHESES)

Variable	All listings	Listings that were sold
Number of observations	5785	3408
1991 assessed value[a]	\$212,833	\$223,818
	(132,453)	(135,553)
Original asking price	\$229,075	\$242,652
	(193,631)	(202,971)
Sales price	N.A.	\$220,475
		(180,268)
Loan/value (LTV)[b]	0.63	0.59
	(0.42)	(0.41)
Percent with LTV[b] > 80%	38%	32%
Percent with LTV[b] > 100%	19%	15%
Percent with last sale price > Predicted selling price[b]	55%	50%
Square footage	936	977
	(431)	(444)
Bedrooms	1.5	1.6
	(0.7)	(0.7)
Bathrooms	1.2	1.2
	(0.4)	(0.4)
Months since last sale	66	66
	(37)	(38)

a. The 1991 assessed value comes from the City of Boston Assessor's Office. It is the estimated market value of the property as of 1/1/90, the beginning of the sample period, and contains no information from sales after that date.

b. The predicted value is for the quarter that the property enters the market and comes from a hedonic regression over the sample period using all sold properties. Regression results are available from the authors.

- Not a typical cross-section of US (or even Boston) properties

Table II: Log Original Asking Price

LOSS	0.35	0.25	0.63	0.53	0.35	0.24
	(0.06)	(0.06)	(0.04)	(0.04)	(0.06)	(0.06)
LOSS-squared			−0.26	−0.26		
			(0.04)	(0.04)		
LTV	0.06	0.05	0.03	0.03	0.06	0.05
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Estimated value in 1990	1.09	1.09	1.09	1.09	1.09	1.09
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Estimated price index at quarter of entry	0.86	0.80	0.91	0.85		
	(0.04)	(0.04)	(0.03)	(0.03)		
Residual from last sale price		0.11		0.11		0.11
		(0.02)		(0.02)		(0.02)
Months since last sale	−0.0002	−0.0003	−0.0002	−0.0003	−0.0002	−0.0003
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Dummy	No	No	No	No	Yes	Yes

- Columns 1/2: Upper/Lower Bound
- Column 2 shows noisy measure for unobserved quality
- A 0.35 LOSS coefficient means a +10% in LOSS yields a +3.5% in sale price
- Quadratic term shows convexity in losses
- LTV value lower than in previous study
- Dummies for quarter don’t effect results

Table III: Robustness Checks

Variable	(1) All listings	(2) All listings	(3) All listings	(4) All listings	(5) Loan to value < 0.5	(6) Loan to value < 0.5
LOSS	0.29	0.24	0.40	0.29	0.37	0.28
	(0.09)	(0.09)	(0.07)	(0.07)	(0.10)	(0.11)
REAL LOSS	0.06	0.01				
	(0.04)	(0.04)				
LTV	0.05	0.05	0.07	0.06		
	(0.01)	(0.01)	(0.01)	(0.01)		
Estimated value in 1990	1.09	1.09	1.09	1.09	1.09	1.09
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Estimated price index at quarter of entry	0.86	0.80	0.91	0.83	0.75	0.72
	(0.03)	(0.03)	(0.04)	(0.04)	(0.05)	(0.05)
Residual from last sale price		0.11		0.10		0.06
		(0.02)		(0.02)		(0.02)
Estimated price index at quarter of last sale			−0.10	−0.06		
			(0.02)	(0.02)		

- 1 & 2: add REAL LOSS to test "nominal hypothesis" – tests not significant, but LOSS is significant and R-squared higher for only nominal model
- 3 & 4: add price index at quarter of last sale
- 5 & 6: Restrict sample to low LTV

Table IV: Owner-Occupants vs. Investors

Variable	(1) All listings	(2) All listings	(3) All listings	(4) All listings
LOSS × owner-occupant	0.50	0.42	0.66	0.58
	(0.09)	(0.09)	(0.08)	(0.09)
LOSS × investor	0.24	0.16	0.58	0.49
	(0.12)	(0.12)	(0.06)	(0.06)
LOSS-squared × owner-occupant			−0.16	−0.17
			(0.14)	(0.15)
LOSS-squared × investor			−0.30	−0.29
			(0.02)	(0.02)

- Sub-sample includes listings after 1/1/92
- Investor LOSS effects about half of owner-occupants
- LTV difference not significant
- Column 2 investor loss not significant
- Large difference in LOSS-squared showing that investors mitigate their marginal response more

Table V: Sold vs. Unsold

Variable	(1) All listings	(2) All listings	(3) All listings	(4) All listings
LOSS × unsold	0.45	0.34	0.61	0.50
	(0.06)	(0.06)	(0.06)	(0.06)
LOSS × sold	0.27	0.16	0.60	0.49
	(0.08)	(0.08)	(0.04)	(0.04)
LOSS-squared × unsold			−0.16	−0.16
			(0.09)	(0.09)
LOSS-squared × sold			−0.29	−0.29
			(0.02)	(0.02)
LTV × unsold	0.04	0.04	0.03	0.03
	(0.02)	(0.02)	(0.01)	(0.01)
LTV × sold	0.06	0.06	0.03	0.02
	(0.02)	(0.02)	(0.01)	(0.01)

- Loss effect smaller for those who actually sell
- Marginal effect of loss diminishes more quickly for those who sell
- Difference in LTV not significant

Table VI: New Dependant Variable – Transaction Prices

Variable	(1) All listings	(2) All listings
LOSS	0.18	0.03
	(0.03)	(0.08)
LTV	0.07	0.06
	(0.02)	(0.01)
Residual from last sale price		0.16
		(0.02)
Months since last sale	−0.0001	−0.0004
	(0.0001)	(0.0001)
Dummy variables for quarter of entry	Yes	Yes
Number of observations	3413	3413

Nonlinear least squares estimation of the equation $P = X\beta + T\theta + mLOSS + gLTV$, where $LOSS = (P^0 - X\beta - T\theta)$, X is a vector of property attributes, T is a set of dummies for the quarter of sale. P^0 is the previous sale price, and LTV is as defined in Table II. In column (2) the right-hand side is expanded to include a term that for observations with a previous sale prior to 1990 equals the residual from the last sale, as in the previous tables, and for the remaining observations is equal to $(P^0 - X\beta - S\theta)$, where S is a set of dummies for the quarter of previous sale, of the same dimension and mapping as T. LTV is the greater of the difference between the ratio of loan to value and 0.80, and zero. The standard errors are heteroskedasticity robust and corrected for multiple observations of the same property.

- Upper bound on loss cut in half (non-sellers not included)
- Lower bound not significant
- LTV still significant since it represents institutional constraints (vs. psychological)

Table VII: Hazard Rate – DV is Time on Market

Variable	(1) All listings	(2) All listings	(3) All listings	(4) All listings
LOSS	−0.33	−0.63	−0.59	−0.90
	(0.13)	(0.15)	(0.16)	(0.18)
LOSS-squared			0.27	0.28
			(0.07)	(0.07)
LTV	−0.08	−0.09	−0.06	−0.06
	(0.04)	(0.04)	(0.04)	(0.04)
Estimated value in 1990	0.27	0.27	0.27	0.27
	(0.04)	(0.04)	(0.04)	(0.04)
Residual from last sale		0.29		0.29
		(0.07)		(0.07)
Months since last sale	−0.003	−0.004	−0.003	−0.004
	(0.001)	(0.001)	(0.001)	(0.001)

- Right censored hazard rate model
- Interpretation: A 10% loss on property leads to between a 3(1-exp(-.033)) and a 6(1-exp(-.063))% reduction in weekly sale hazard

Authors' Conclusions

- Loss aversion affects seller behavior
  - Ask price 25-35% higher of difference between expected and original price
  - Sale prices are 3 -18% of that difference higher
  - Lower hazard rate of sale
- Results twice as large for owner-occupants vs. investors (experience)
- For a given loss, list price of sellers lies between list price of withdrawers and actual selling price

Conclusions Cont’d

- Real estate markets differ from perfect asset markets because:
  - Transaction prices determined by seller characteristic in addition to asset attributes
    - Loss aversion
    - Equity constraints
  - Volume falls when prices decline
    - Can’t be explained by perfect asset markets, loss aversion and equity constraints needed.
- Compare to Labor papers
  - Only losses shown
  - Narrow bracketing: frame size?

Future Research

- Determine Third element of why volume falls when prices fall (authors' current research)
- Do study with more "typical" demographics and compare
- Look at reference point changes in increasing markets
- Look for explanations of loss aversion in similar data sets
  - property as identity

Criticisms / Questions

- If only looking at losses, is this really loss aversion?
  - Gains > Uncertainty > Losses (without strong liquidity constraints)
  - If people can withdraw, may not be severely constrained
- If latent characteristics change, then *v* is mis-specified. Is this substantial?
- Censored data not explained for most regressions (expect hazard rate model), but data set ended in boom, so effect may be small

2 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

2.1 Endowment Effect

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

2.2 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)

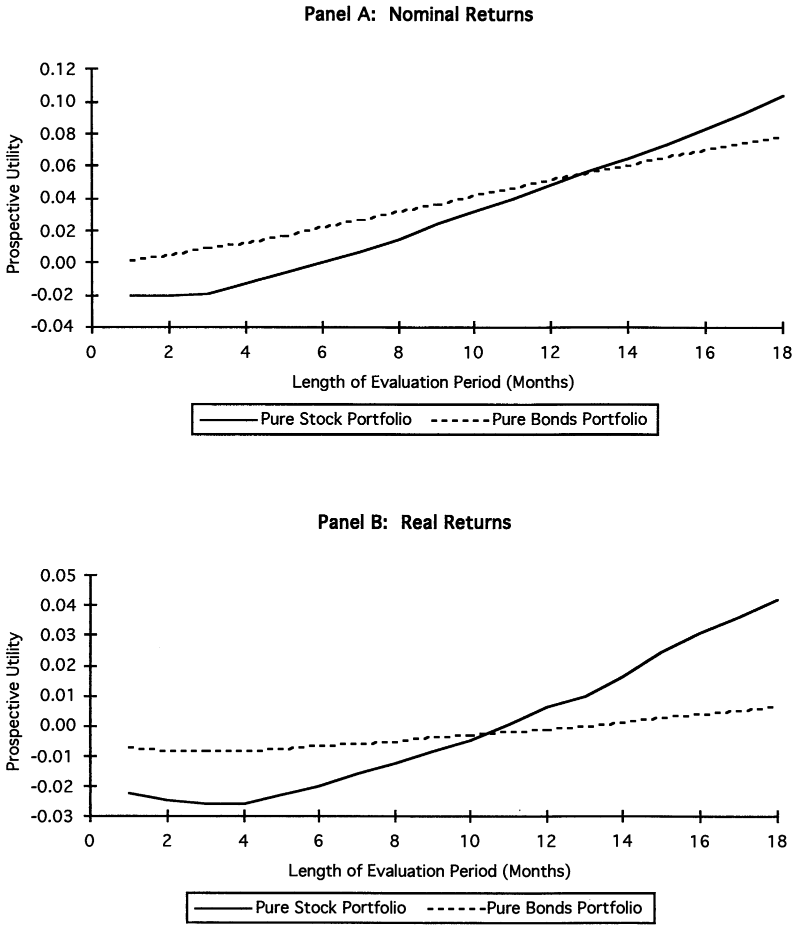


FIGURE I
Prospective Utility as Function of the Evaluation Period

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

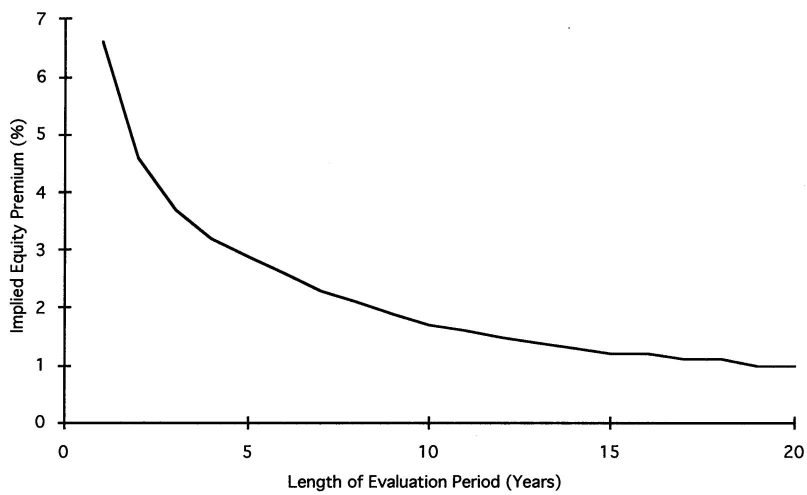


FIGURE III
Implied Equity Premium as Function of the Evaluation Period

- Haigh and List (JF, 2004) **(E)** + earlier experiments

- Experienced traders vs. students

- Compare attitude to risk

- Invest up to 100 points in a gamble:

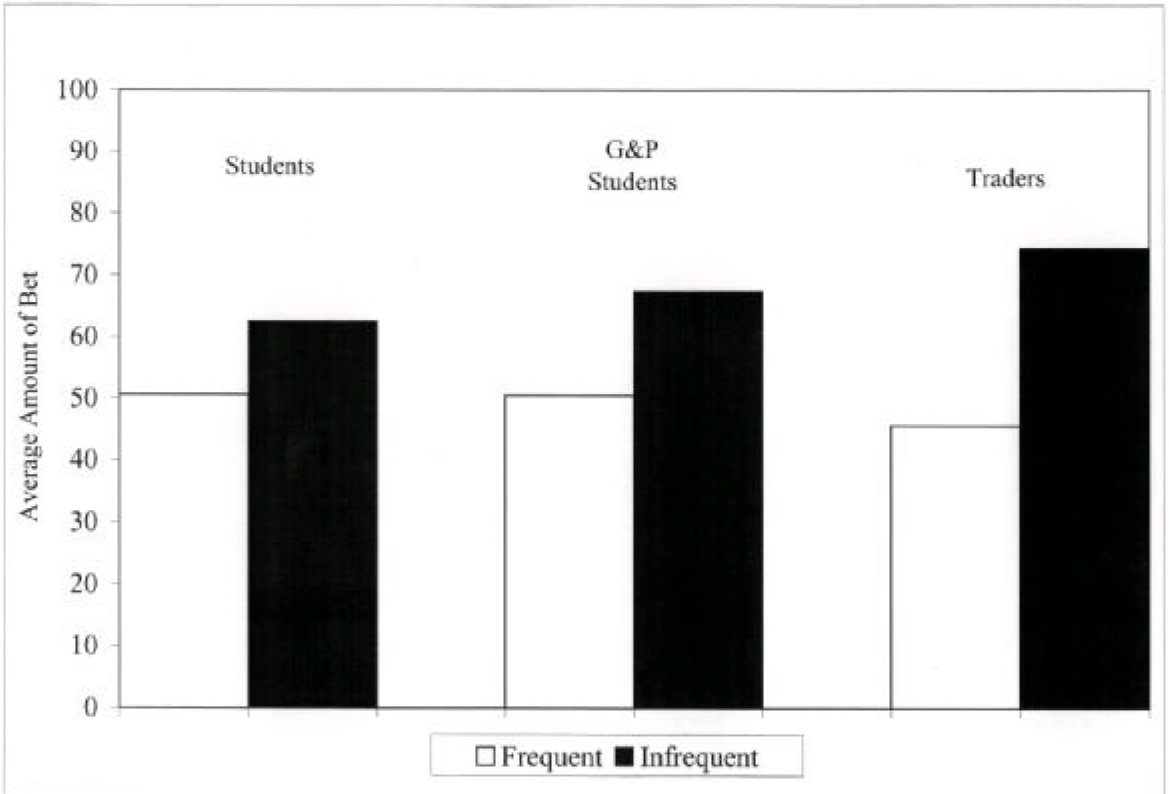
  - $p = 1/3$: get 350 points

  - $p = 2/3$: get 0 points

  - Not explained too well (Sarah)

- Conversion rates 1:1 (students) and 4:1 (investors)

- Nine rounds



Note: G&P denotes Gneezy and Potters (1997).

Figure 1. Comparing betting patterns.

Table II
Regression Results

Variable	**Specification** (1)	(2)
Constant	85.2*	81.9*
	(3.0)	(3.2)
Student	-16.9*	-10.3*
	(3.9)	(3.8)
Treatment F	-36.7*	-38.5*
	(4.1)	(4.9)
*Student*Treatment F*	22.7*	13.4*
	(5.5)	(6.3)
R^2	0.11	0.11
c^2(3 d.f.)	42.1*	200.6*
Subject Random Effects	No	Yes
Time Effects	No	Yes
N	1062	1062

Notes:
1. Dependent variable is the individual bet. "Trader" is the omitted subject category and therefore represents the baseline group. *Student (Treatment F)* is the student (treatment) indicator variable that equals 1 if the subject was a student (in Treatment F), 0 otherwise. *Student*Treatment F* is the student indicator variable interacted with the frequent feedback treatment variable.
2. Specification (1) is a Tobit model. Specification (2) is a random effects Tobit model.
3. The c^2 values provide evidence of the models' explanatory power. In both cases our model is significant at the $p <$ .01 level.
4. Standard errors are in parentheses beneath coefficient estimates; * denotes significance at the $p < .05$ level.

- Frequent feedback: invest every period, with feedback every period

- Infrequent feedback: invest every 3 periods, with feedback every 3 periods

- Myopic Loss Aversion: Invest more with infrequent feedback (losses less frequent)

- Standard Theory: Does not matter

- Myopic Loss Aversion effect for both students and traders

- Effect strong for traders!

- Why?
  - Traders ‘trained’ that losses are bad (Vikram, Rob L.)
  - Do people learn better in ‘important’ tasks?

2.3 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)

2.4 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)

2.5 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

-

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

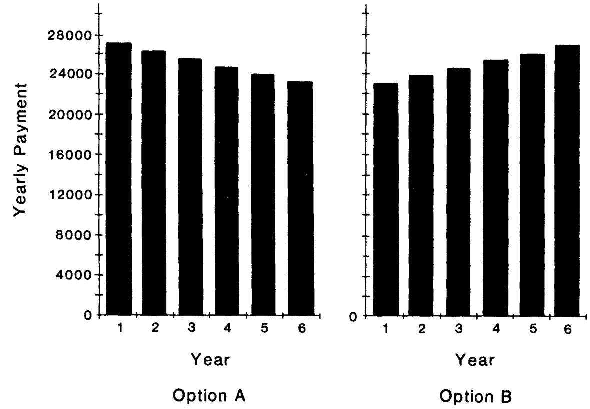


FIG. 2.—Graphical depiction of increasing and decreasing payment options

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,

- 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

3 Framing: Coherent Arbitrariness

Yesim

Coherent Arbitrarines

Ariely, Loewenstein, Prelec

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)

Real World Anchors

- Not think about SSN when purchasing
- What are some possible anchors in the real world? What if people have different anchors from each other?
- Observed prices of similar products serving as an anchor, results in an “arbitrary” equilibrium.
- If people were able to compare all prices of all goods, then could they determine the price of any good by fixing one price arbitrarily?

- In the rest of the experiment authors try to show that people do not have a mapping of their exact utilities to trade. They argue that every adult must know the value of pleasure or pain, and this is a very commonly experienced thing. (However people are not used to pricing it)
- They want to ask:
  - Do people have pre-existing valuations of pleasure vs. pain (annoying noise)?
- Another cute anchoring example: How much would you pay/accept to have Dan Ariely recite poetry?

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.

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.

So what?

- People seem to get the ordering right. Do we care about absolute levels of utility?
- Given a price for one good, if all other prices can be set accordingly. One of many equilibria, but people are equally happy.
- *BUT choices can be narrowly framed!*
- More on this later.

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)

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.

Table 5

The impact of excluding observable income from the main analysis

	(1) No controls	(2) Only Income	(3) All Observables
Intercept	1.877	-1.757	-1.621
	(0.735)	(0.724)	(0.697)
Median Rent (t)	0.462	0.478	0.494
	(0.098)	(0.088)	(0.087)
Median Rent (t-1)	0.221	0.206	0.203
	(0.092)	(0.081)	(0.079)
Income	--	0.348	0.284
	--	(0.027)	(0.029)
Child	--	--	0.045
	--	--	(0.017)
Adult	--	--	0.146
	--	--	(0.044)
Age	--	--	0.004
	--	--	(0.007)
Age squared (*100)	--	--	-0.002
	--	--	(0.007)
College	--	--	0.132
	--	--	(0.036)
Female	--	--	0.021
	--	--	(0.047)
Number of observations	646	646	646

Notes:

Robust standard errors below parameter estimates

Column 3 of table 6 is the same regression as Column 2 in Table 4

3.2 Other markets

- Marketing: sales, advertising

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

- Political decisions:
  - to cut taxes, frame as losses ("death tax")
  - To increase tax, construe together with benefits (education)