Loss Aversion and Seller Behavior: Evidence from the Housing Market

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Outline

- Present findings on loss aversion in the housing market
- Discuss other behavioral models that might apply in the housing market
- Preliminary results on seller adjustments to market shocks (G&M, ver III- if time permits)

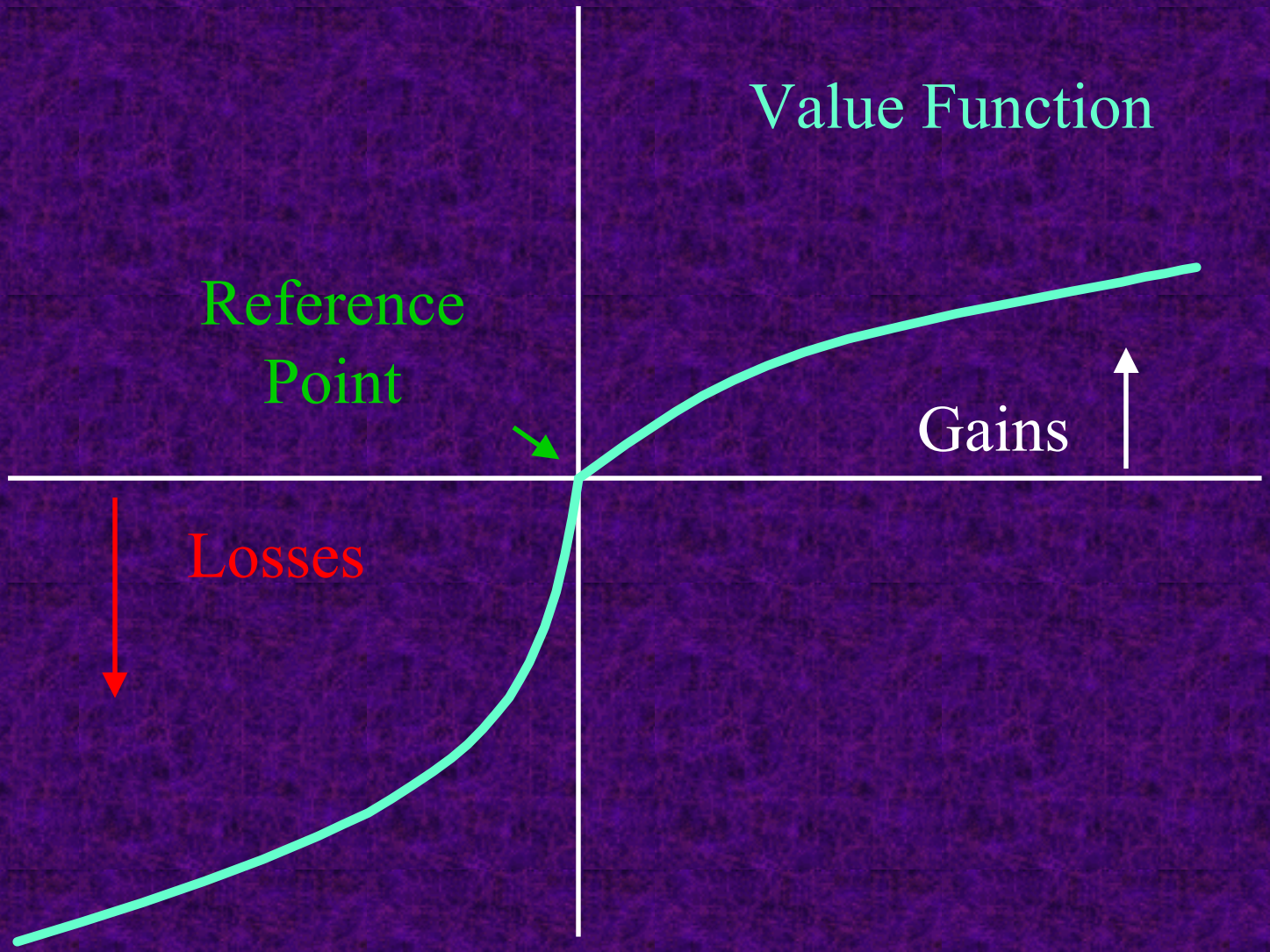
Loss Aversion

- "Sellers are reluctant to realize a loss on their property"

  - *Prospect Theory* (Kahneman & Tversky, 1979)
    - Value function has a kink at the origin
    - Subjects are twice as sensitive to losses as gains

  - *Money Illusion* (Shafir, Diamond, & Tversky 1995)
    - Confusion between nominal and real values

Prospect Theory



Housing is potentially a good market to look for *Loss Aversion*

- Most owners are inexperienced in trading houses
- Few professional buyers and sellers
- Arbitrage is expensive
- Role of RE agents???
- Nonetheless, housing is a large and important market
  - § $15 Trillion, or 30-35% of US household net worth
  - § Typical retiree has 4 times as much housing equity as liquid assets

Loss Aversion may explain (+) correlation between house prices & trading volume

- Sales volume can vary by as much as 300 percent over the cycle
  - In downturns there is no liquidity
  - Expected time to sale is as much as 4.5 years
- Persistent pattern in US, UK & French markets
- May apply to other financial markets as well

Alternative Explanation: *Liquidity Constraints*

- Housing is a highly leveraged asset
- When house prices fall, homeowners with a high mortgage become "locked-in" (Genesove & Mayer, *AER*, 1997)
  - Set higher asking prices
  - Longer "time on the market"
- Problem: liquidity constraints alone do not explain the extreme variations in volume

Major Findings:

- Potential sellers who are subject to losses set higher ask prices by 25% to 35% of the projected loss

- Successful sellers also exhibit loss aversion
  - Higher asking prices of 16%-27% of expected loss
  - Selling prices are higher by 3-18% of projected loss
  - Tradeoff: lower hazard rate of sale

- Investors also exhibit loss aversion, but to a lesser degree than owner-occupants

Previous Literature: *Loss Aversion*

- Theory is based on experimental evidence
- Direct (non-experimental) evidence: stock investors are reluctant to sell their losses
  - US, Israel, Sweden (Odean; Shapiro & Venezia; Grinblatt & Keloharju, others…)
  - Portfolio considerations
  - Seller expectations
- Does *loss aversion* impact "market" prices?

Data

- Property listings in Boston condominium market
  - 1990-1997
  - Source: LINK- private listing service
  - Original ask price, final selling price (if sold), time on the market
- Deeds records and assessment data
  - 1982-1997
  - Many property attributes
  - Mortgage amounts, all sales and refinacings

Sample

- 5,792 listings
- Average property worth $220,000 in 1990
- Relatively wealthy, high-income households
- 40% of units owned by investors

Condominium Price Index
1988-1997

1988= 100

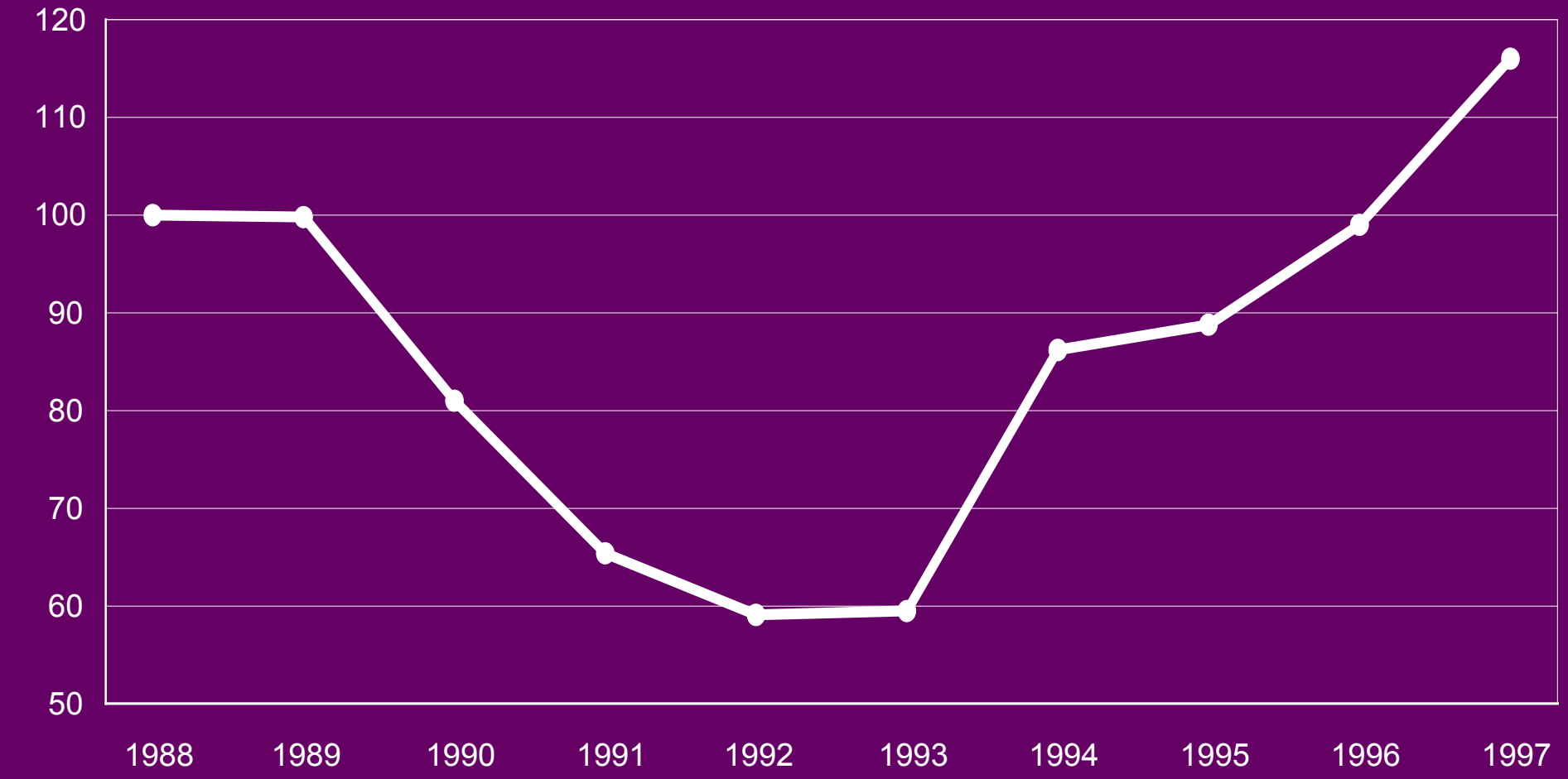


Figure 6
% that Original Ask Price Exceeds Estimated Value
1990-1997

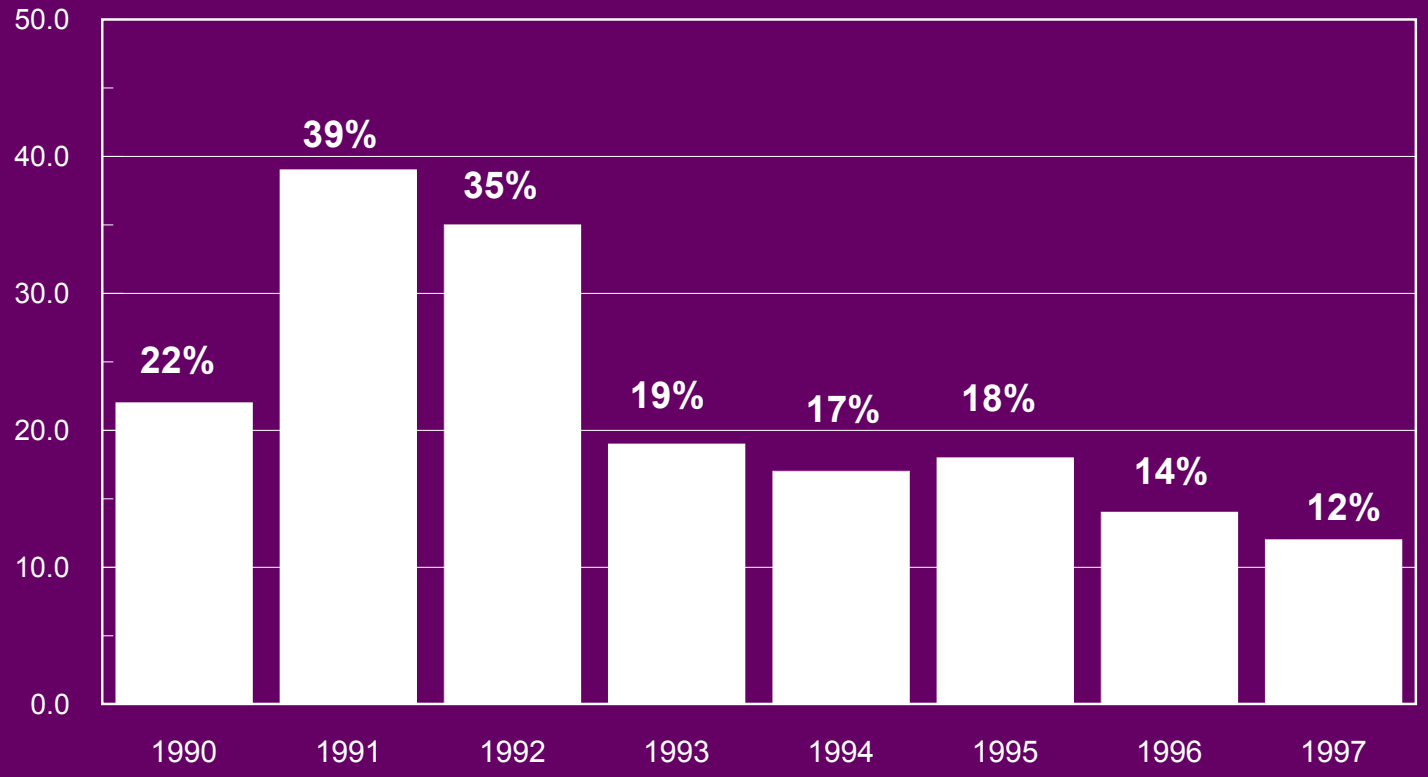


Figure 3
Total Condominium Sales in Downtown Boston
1990-1997

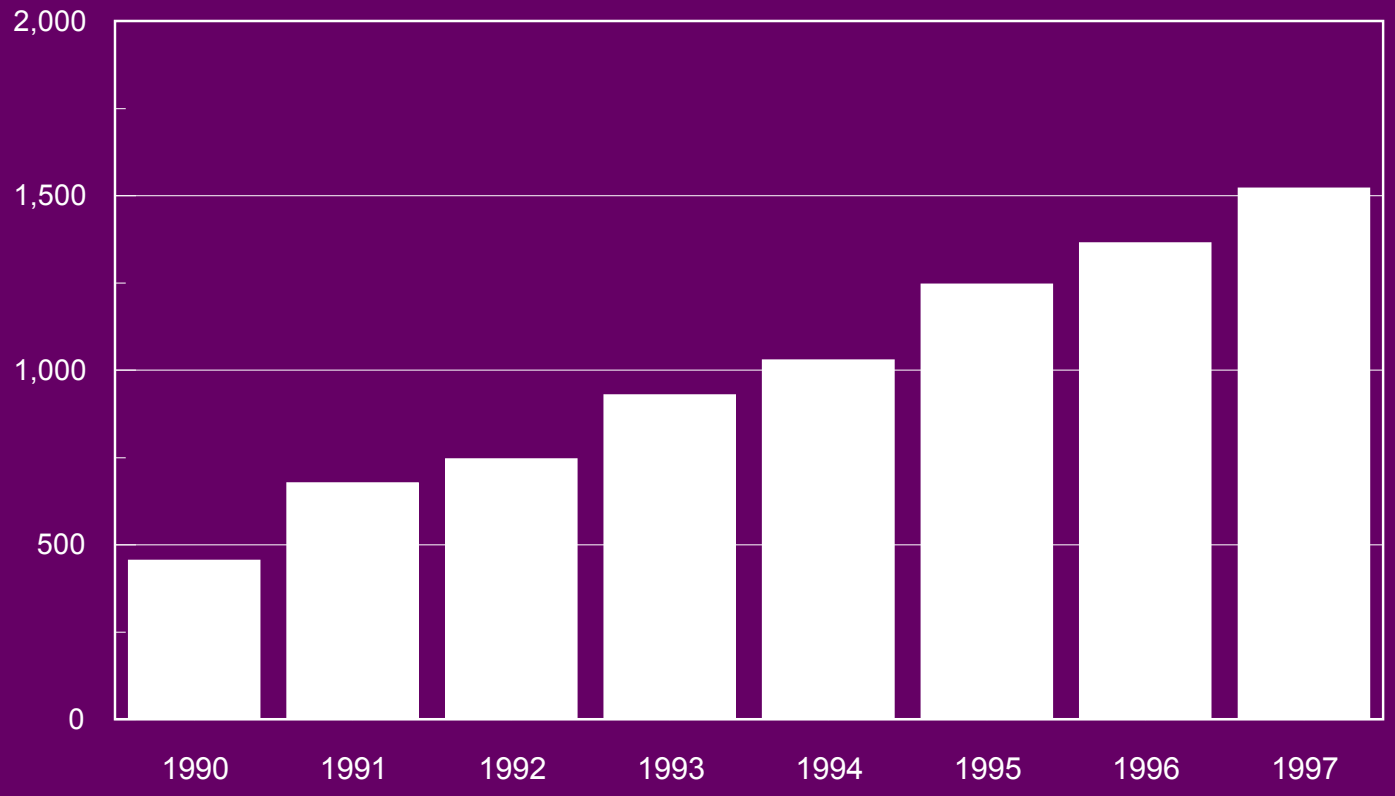
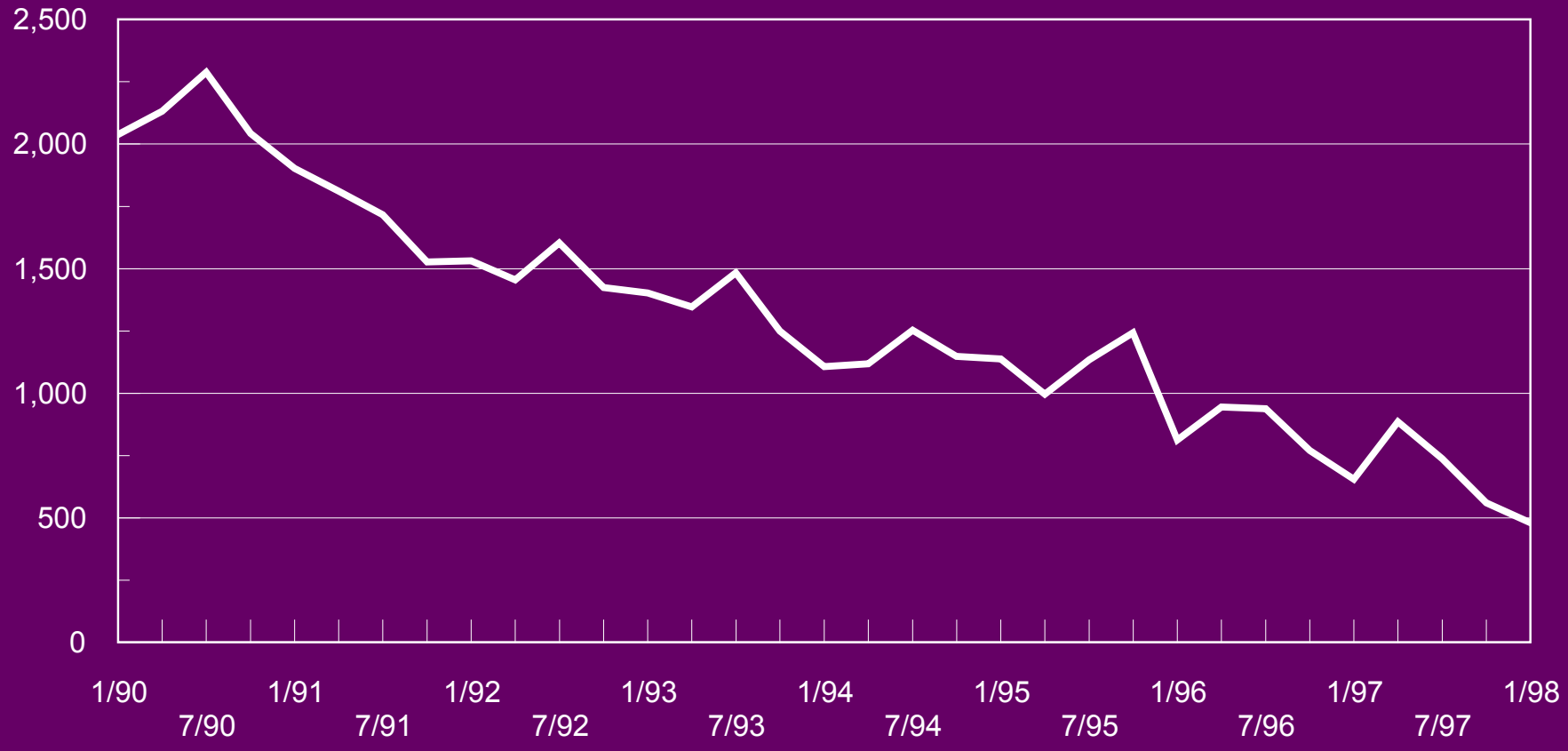


Figure 4
Inventory of Condominiums for Sale
1990:q1-1998:q1



Identification

- Compare otherwise identical sellers at a given point in time, one of whom has a loss, the other has a gain
- Control for current market conditions and expectations
- Compare sellers based on loan amounts

Model of List Prices

- List= $a_0 + a_1$ Predicted Sale Price + a_2 LOSS* + e
- LOSS*= (Purchase Price - Predicted Sale Price)$^+$
- Problems:
  - May be unobserved quality (potentially serious problem)
  - Did the seller "overpay" when he/she bought the property?

Model I

- List= $a_0 + a_1$ Predicted Sale Price + a_2 LOSS + e_I

- Overestimates "true" coefficient on LOSS due to unobserved quality

Model II

- List= a_0 + a_1 Predicted Sale Price + a_2 LOSS + a_3 Purchase Price + e_{II}
- Include previous purchase price to control for unobserved quality
- Model II underestimates "true" coefficient on LOSS because the previous purchase price also includes the over/under payment by owner

List Price Results

- The data show a significant impact of loss aversion on list prices

	Coefficient on LOSS	Coefficient on $LOSS^2$
Model I	0.35 (0.06)	
Model II	0.25 (0.06)	
Model I	0.63 (0.04)	-0.26 (0.04)
Model II	0.53 (0.04)	-0.26 (0.04)

Table 2
Loss Aversion and List Prices

Dependent Variable: Log(Original Asking Price)
OLS equations, standard errors in parentheses

Variable	(1) MODEL I	(2) MODEL II	(3) MODEL I	(4) MODEL II
LOSS	0.35 (0.06)	0.25 (0.06)	0.63 (0.04)	0.53 (0.04)
LOSS-squared			-0.26 (0.04)	-0.26 (0.04)
LTV	0.06 (0.01)	0.05 (0.01)	0.03 (0.01)	0.03 (0.01)
Estimated Value in 1990	1.09 (0.01)	1.09 (0.01)	1.09 (0.01)	1.09 (0.01)
Estimated Price Index at Quarter of Entry	0.86 (0.03)	0.80 (0.03)	0.91 (0.03)	0.85 (0.03)
Residual from Last Sale Price		0.11 (0.02)		0.11 (0.02)
Months Since Last Sale	-0.0002 (0.0001)	-0.0003 (0.0001)	-0.0002 (0.0001)	0.0004 (0.0002)
Constant	-0.93 (0.10)	-0.91 (0.10)	-0.97 (0.10)	-0.94 (0.19)
R-Squared	0.85	0.86	0.86	0.86
Number of Observations	5,792	5,792	5,792	5,792

List Price Results: Loan/Value < 50%

- Can loss aversion be confounded with equity constraints or wealth effects?
- NO! Loss aversion applies equally to owners with Loan/Value < 50%.

	Coefficient on LOSS
Model I	0.37 (0.06)
Model II	0.28 (0.06)

Is *Loss Aversion* a Nominal or Real Concept?

- The data show inflation (or real losses) play a very minor role in explaining *loss aversion*

	Coefficient on Nominal LOSS	**Coefficient on Real LOSS**
Model I	0.29 (0.09)	0.06 (0.04)
Model II	0.24 (0.09)	0.01 (0.04)

List Price Results: Owner-Occupants vs Investors

- Do investors also exhibit loss aversion?
- Yes, but investors exhibit about one-half the degree of loss aversion as owner-occupants.

	Coefficient on LOSS: *Owner-Occupants*	**Coefficient on LOSS: *Investors***
Model I	0.50 (0.09)	0.24 (0.12)
Model II	0.42 (0.09)	0.16 (0.12)

Table 5
Loss Aversion and List Prices: Owner-Occupants versus Investors

Dependent Variable: Log(Original Asking Price)
OLS equations, standard errors in parentheses

Variable	(1) MODEL I	(2) MODEL II	(3) MODEL I	(4) MODEL II
LOSS X Owner-Occupant	0.50 (0.08)	0.42 (0.09)	0.66 (0.08)	0.58 (0.08)
LOSS X Investor	0.24 (0.12)	0.16 (0.12)	0.58 (0.06)	0.49 (0.06)
LOSS-squared X Owner-Occupant			-0.16 (0.14)	-0.17 (0.14)
LOSS-squared X Investor			-0.30 (0.02)	-0.29 (0.02)
LTV X Owner-Occupant	0.03 (0.02)	0.03 (0.02)	0.01 (0.01)	0.01 (0.01)
LTV X Investor	0.05 (0.03)	0.05 (0.03)	0.02 (0.02)	0.02 (0.02)
Dummy for Investor	-0.019 (0.014)	-0.020 (0.013)	-0.029 (0.012)	-0.030 (0.011)
Constant	-0.98 (0.13)	-0.96 (0.13)	-1.02 (0.13)	-1.00 (0.13)
R-Squared	0.85	0.85	0.86	0.86
Number of Observations	3,687	3,687	3,687	3,687
P-value for test: Coefs on Loss and LTV are equal, Owner-Occupants & Investors	0.04	0.03	0.03	0.02

List Price Results: Sold vs. Unsold Properties

- Are the coefficients on LOSS driven by unrealistic owners who will never sell?
- Partly true. Owners who eventually sell are less loss averse than owners who do not sell.

	Coefficient on LOSS: *Unsold Properties*	**Coefficient on LOSS: *Sold Properties***
Model I	0.45 (0.06)	0.27 (0.08)
Model II	0.34 (0.06)	0.16 (0.08)

Table 6
Loss Aversion and List Prices: Sold and Unsold Properties

Dependent Variable: Log(Original Asking Price)
OLS equations, standard errors in parentheses

Variable	(1) MODEL I	(2) MODEL II	(3) MODEL I	(4) MODELII
LOSS X Unsold	0.45 (0.06)	0.34 (0.06)	0.61 (0.06)	0.50 (0.06)
LOSS X Sold	0.27 (0.08)	0.16 (0.08)	0.60 (0.04)	0.49 (0.04)
LOSS-squared X Unsold			-0.16 (0.09)	-0.16 (0.09)
LOSS-squared X Sold			-0.29 (0.02)	-0.29 (0.02)
LTV X Unsold	0.04 (0.02)	0.04 (0.02)	0.03 (0.01)	0.03 (0.01)
LTV X Sold	0.06 (0.02)	0.06 (0.02)	0.03 (0.01)	0.02 (0.01)
Dummy for Sold	-0.03 (0.01)	-0.03 (0.01)	-0.03 (0.01)	-0.04 (0.01)
Constant	-0.98 (0.10)	-0.96 (0.10)	-1.01 (0.10)	-0.99 (0.10)
R-Squared	0.86	0.86	0.86	0.86
Number of Observations	5,792	5,792	5,792	5,792
P-value for test: Coefs on LOSS and LTV are equal, Sold and Unsold Properties	0.09	0.06	0.07	0.06

Sale Prices

- Impact of loss aversion goes beyond list prices- Sellers facing a projected loss actually obtain higher selling prices

- Sales price regressions (NLLS) show:

	Model I	Model II
Coefficient on LOSS:	0.18 (0.02)	0.03 (0.08)

- Get similar results in Riverside County single-family homes

Table VI
Loss Aversion and Transaction Prices

Dependent Variable: Log(Transaction Price)
NLLS equations, standard errors in parentheses

Variable	(1) MODEL I	(2) MODEL II
LOSS	0.18 (0.03)	0.03 (0.08)
LTV	0.07 (0.02)	0.06 (0.01)
Residual from Last Sale Price		0.16 (0.02)
Months Since Last Sale	-0.0001 (0.0001)	-0.0004 (0.0001)
Dummy Variables for Quarter of Entry	Yes	Yes
Number of Observations	3,413	3,413

Probability of Sale

- Tradeoff: higher reservation price leads to a lower probability of sale for a given time on the market

- A 10% increase in the projected loss results in a 3-6 percent decline in the probability of sale in any given week

Table 8
Hazard Rate of Sale

Duration variable is the number of weeks the property is listed on the market
Cox proportional hazard equations, standard errors in parentheses

Variable	(1) MODEL I	(2) MODEL II	(3) MODEL I	(5) MODEL II
LOSS	-0.33 (0.13)	-0.63 (0.15)	-0.59 (0.16)	-0.90 (0.18)
LOSS-squared			0.27 (0.07)	0.28 (0.07)
LTV	-0.08 (0.04)	-0.09 (0.04)	-0.06 (0.04)	-0.06 (0.04)
Estimated Value in 1990	0.27 (0.04)	0.27 (0.04)	0.27 (0.04)	0.27 (0.04)
Residual from Last Sale		0.29 (0.07)		0.29 (0.07)
Months Since Last Sale	-0.003 (0.001)	-0.004 (0.001)	-0.003 (0.001)	-0.004 (0.001)
Dummy Variables for Quarter of Entry	yes	yes	yes	yes
Log Likelihood	-26104.4	-26094.1	-26101.8	-26091.3
Number of Observations	5,792	5,792	5,792	5,792

Major Findings

- Potential sellers set higher ask prices by 25% to 35% of the projected loss
- Loss aversion diminishes with the size of the loss
- Loss aversion depends on nominal, not real loss
- Successful sellers also exhibit loss aversion
  - Higher asking prices of 16-27% of expected loss
  - Selling prices are higher by 3-18% of projected loss
  - Tradeoff: lower hazard rate of sale
- Investors exhibit loss aversion, but to a lesser degree than owner-occupants

Policy Issues

- What will happen if house prices fall in the next 5 years?
- Low inflation or deflationary environments present greater opportunities for nominal losses
- In Japan and other Asian markets:
  - Real estate prices have fallen by up to 80%
  - Debt forgiveness may not fully resolve liquidity crisis if owners exhibit loss aversion

Research Agenda: Behavioral Economics & Housing

- How do sellers choose their reference point?
  - Local prices (Loewenstein & Simonsohn)
  - Role of transaction costs
  - Sales of similar properties

- How do market participants set their expectations of future market changes?
  - Do sellers index prices properly? (No---Genesove & Mayer III)
  - Role of sentiment/investor psychology (Case & Shiller)

Research Agenda: Behavioral Economics & Housing

- Does loss aversion apply (equally) to commercial real estate markets? (yes?)

- To what extent does "better" information reduce the degree of loss aversion?