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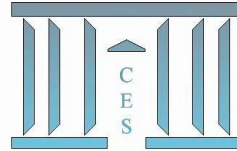
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## Loss Aversion and Seller Behavior : Evidence from the Housing Market : Comment Working Paper

Florent BUISSON

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Loss Aversion and Seller Behavior : Evidence  
from the Housing Market : Comment  
Working Paper

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## **Résumé**

Dans un article souvent cité, Genesove and Mayer (2001) observent que les vendeurs sur le marché immobilier sont réticents à vendre à perte par rapport à leur prix d'achat, et attribuent ce phénomène à l'aversion pour la perte. Je montre que l'aversion pour la perte ne peut pas expliquer ce phénomène.

## **Abstract**

In an often quoted article, Genesove and Mayer (2001) observe that house sellers are reluctant to sell at a loss, and attribute this finding to loss aversion. I show that loss aversion cannot explain this phenomenon.

**JEL classification numbers:** D03, D11, D83.

**Mots-clés :** Aversion pour la perte, théorie des perspectives, marché immobilier.

**Keywords:** Loss aversion, prospect theory, housing market.

# 1 Introduction

Genesove and Mayer (2001) observe on Boston's housing market data that house sellers are reluctant to sell at a loss relative to their former buying price. They attribute this phenomenon informally to loss aversion and consider it as the housing market version of the disposition effect. The disposition effect is a behavioral anomaly in finance: people have a tendency to sell winners and hold losers, even when the contrary would be more efficient. The disposition effect has also been attributed to loss aversion (Shefrin and Statman (1985)), but only informally.

I build a two-periods model of search with loss aversion and show that loss aversion cannot explain the observed phenomenon: introducing loss aversion in the model actually decreases the reservation value of the agent, i.e. he is willing to accept lower offers.

I then discuss the phenomenon observed by Genesove and Mayer (2001), and suggest, based on the existing literature, that anchoring is a better explanation of it.

## 2 Prospect Theory in a Two-periods setting

We consider an agent who draws an offer from a probability distribution, with CDF  $F(x)$  and PDF  $f(x)$  on an interval  $I = [x_{min}, x_{max}]$ . If she refuses the first offer, she can draw an other offer (noted  $y$ ) that will be final. The second draw is independent from the first. Any second-period offer is discounted relative to first-period offers at a rate  $\beta$ , and utility is linear:  $u(x) = x$ .

The value of having the first offer  $x$  is

$$V(x) = \max \left\{ u(x), \beta \int_I u(y)f(y)dy \right\} = \max \left\{ x, \beta \int_I yf(y)dy \right\} = \max \{x, \beta E(y)\}$$

A standard result in search theory is that the solution strategy takes the form of a reservation value: in the first period, the agent accepts any offer

higher than  $x^* = \beta E(y)$  and rejects any offer lower than  $x^*$ .

We then consider an agent with loss aversion (Kahneman and Tversky (1979)). In that case the utility function for a reference point  $r$  is

$$\begin{aligned} u(x, r) &= x - r && \text{if } x \geq r \\ &= \lambda(x - r) && \text{if } x < r \end{aligned}$$

Where  $\lambda$  is the parameter representing the strength of loss aversion:  $\lambda = 1$  means no loss aversion and for  $\lambda > 1$ , the higher  $\lambda$  the stronger loss aversion. In the seminal work of Kahneman and Tversky, their preferred value for  $\lambda$  was 2.25.

We have then two different cases to examine, depending on whether  $r \notin \text{Int}(I)$  or  $r \in \text{Int}(I)$ . In the first case, the utility function is no more piecewise: the agent interprets any possible offer as a gain (if  $r \leq x_{min}$ ), or she interprets any possible offer as a loss (if  $r \geq x_{max}$ ). When  $r \in \text{Int}(I)$ , there exists at least one possible offer strictly lower than  $r$  (this offer would be perceived as a loss) and at least one possible offer strictly higher than  $r$  (this offer would be perceived as a gain), so the utility function follows the piecewise formula *supra*.

**Exterior reference point** When the reference point is outside the range of possible offers, it implies that the utility function is no more piecewise. If the reference point is lower than all possible offers, the agent is never in her loss zone, and  $u(x, r) = x - r$ . The corresponding value function is

$$V(x) = \max \left\{ u(x, r), \beta \int_I u(y, r) f(y) dy \right\} = \max \left\{ (x - r), \beta \int_I (y - r) f(y) dy \right\}$$

Let us define  $\bar{x}$  as the reservation value in the standard case and  $x^*(r)$  as the reservation value associated with the reference point  $r$  when the agent manifests loss aversion.  $x^*(r)$  is defined by

$$u(x^*(r), r) = \beta \int_I u(y, r) f(y) dy$$

which we can rewrite as

$$x^*(r) - r = \beta \int_I (y - r) f(y) dy$$

And

$$x^*(r) = (1 - \beta)r + \beta E(y) = (1 - \beta)r + \bar{x}$$

Reversely, if the reference point is higher than all possible offers, the agent is always in her loss zone and  $u(x, r) = \lambda(x - r)$ , so we have

$$u(x^*(r), r) = \beta \int_I u(y, r) f(y) dy$$

$$\Rightarrow \lambda(x^*(r) - r) = \beta \int_I \lambda(y - r) f(y) dy$$

Simplifying by  $\lambda$  yields

$$x^*(r) = (1 - \beta)r + \beta E(y) = (1 - \beta)r + \bar{x}$$

In both case, we end up with the same formula. We can see that the loss aversion coefficient  $\lambda$  is absent in this formula: the reference point has an impact on the reservation value, but this effect is independent from the asymmetry between gains and losses.

Moreover, with realistic values for  $\beta$  (e.g.  $\beta = 0.99$  for relatively high frequency offers), this effect is quantitatively extremely small and cannot match the observed stickiness in prices.

This result is in line with Wakker (2010), who finds that "loss aversion only concerns mixed prospects. Loss aversion does not affect preferences between pure gain prospects *nor preferences between pure loss prospects*".

**Interior reference point** We have seen that when the reference point is lower than any possible offer, we have, by construction,

$$u(x^*(r), r) = x^*(r) - r$$

and when the reference point is higher than any possible offer, we have

$$u(x^*(r), r) = \lambda(x^*(r) - r)$$

When the reference point is an interior point of I, both cases may apply, depending on whether the reference point is lower or higher than the reservation value of the agent. I examine both cases in turn.

In the first case (low reference point), we have

$$x^*(r) - r = \beta \int_I u(y, r) f(y) dy = \beta \left[ \int_{x_{min}}^r \lambda(y - r) f(y) dy + \int_r^{x_{max}} (y - r) f(y) dy \right]$$

we can obviously isolate  $x^*(r)$  :

$$x^*(r) = r + \beta \left[ \int_{x_{min}}^r \lambda(y - r) f(y) dy + \int_r^{x_{max}} (y - r) f(y) dy \right]$$

I want to know if introducing loss aversion (i.e. taking  $\lambda > 1$ ) will increase or decrease the reservation value, so I simply take the derivative of the reservation value with respect to  $\lambda$ , at the baseline value  $\lambda = 1$ :

$$\frac{dx^*(r)}{d\lambda} \Big|_{\lambda=1} = \beta \int_{x_{min}}^r (y - r) f(y) dy < 0$$

Introducing loss aversion decreases the reservation value.

In the second case (high reference point), we have

$$\lambda(x^*(r) - r) = \beta \left[ \int_{x_{min}}^r \lambda(y - r) f(y) dy + \int_r^{x_{max}} (y - r) f(y) dy \right]$$

I simplify by  $\lambda$  and isolate  $x^*(r)$  :

$$x^*(r) = r + \beta \left[ \int_{x_{min}}^r (y - r) f(y) dy + \int_r^{x_{max}} \frac{1}{\lambda} (y - r) f(y) dy \right]$$

And therefore the derivative of the reservation value with respect to  $\lambda$  is

$$\frac{dx^*}{d\lambda} \Big|_{\lambda=1} = \left[ \beta \left( \frac{-1}{\lambda^2} \right) \int_r^{x_{max}} (y - r) f(y) dy \right] \Big|_{\lambda=1} = -\beta \int_r^{x_{max}} (y - r) f(y) dy < 0$$

We see that from the baseline situation when  $\lambda = 1$  (there is no asymmetry between gains and losses), introducing asymmetry by increasing  $\lambda$  actually *decreases* the reservation value.



We might want to know what is the effect of a variation of the reference point on the reservation value.

When the reference point is lower than the reservation value, we have

$$\frac{d^2 x^*(r)}{d\lambda dr} \Big|_{\lambda=1} = -\beta < 0$$

As the reference point get higher, the negative effect of loss aversion on the reservation value get stronger.

Reversely, when the reference point is higher than the reservation value, we have

$$\frac{dx^*}{d\lambda} \Big|_{\lambda=1} = \beta$$

Here, as the reference point get higher, the negative effect of loss aversion on the reservation value tapers off.

These results means that the effect of loss aversion on the reservation value is maximal for a reference point close to the reservation value. This further undermines the notion that loss aversion has a stronger effect for an "extreme" (very high or very low) reference point.

As a guide for intuition, I computed the reservation value of an agent drawing offers in  $[0; 100]$  with  $\beta = 0.9$  for various values of  $\lambda$  (from  $\lambda = 1$  – standard case – to  $\lambda = 4$ ). The Figure 1 plots the reservation value against the reference point. As we can see, the higher the  $\lambda$ , the lower the reservation value.

### 3 Discussion

I showed that loss aversion cannot explain why people are reluctant to sell their house at a loss when the market has gone down since they bought their house. An alternative explanation to this phenomenon is the anchoring effect : when people must guess a numerical value about which they lack information, they get influenced by numbers that come to their mind even if these numbers are irrelevant to the case in point. The classical demonstration of this effect is Tversky and Kahneman (1974), which finds that announcing

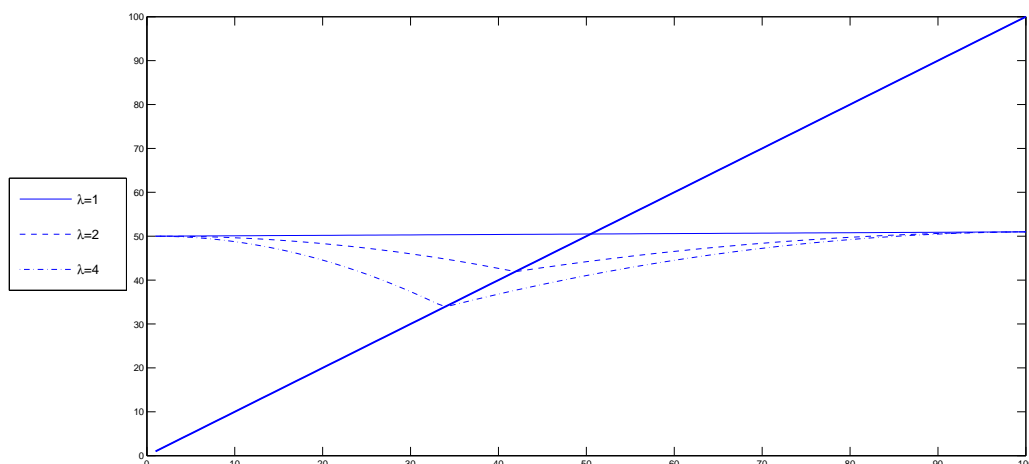


Figure 1: Reservation value as a function of reference point for several values of  $\lambda$

the subjects a random number between 1 and 100 influenced their subsequent estimate of the number of African countries in the United Nations.

In the housing market, the buying price is an obvious anchor for fixing the reselling price. If this explanation is correct, then buying prices should influence reselling prices in both directions : during a boom, people who have bought their house at a low price would post a lower reselling price, which loss aversion cannot explain. This is precisely what we observe : Case and Shiller (1989) and Benítez-Silva, Eren, Heiland, and Jimenez-Martin (2009) find that the buying price influence the reselling price in both directions. In a different market, Beggs and Graddy (2009), who replicate the methodology from Genesove and Mayer (2001) in art auctions, find a symmetric effect of the previous buying price on the new selling price. They conclude

Reference dependence and anchoring are often used interchangeably. Kahneman (1992), however, defines reference dependence as something that influences the reference point in the measurement of gains and losses when they are valued asymmetrically, anchoring as something that influences judgement of what is nor-

mal more generally. Our evidence supports Kahneman's definition of anchoring but does not support Kahneman's definition of reference dependence.

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