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Loss aversion, equity constraints and seller behavior in the real estate market☆

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ABSTRACT

I develop an estimation strategy that can point identify the effects of loss aversion and equity constraints on selling prices using a long panel of data from the San Francisco Bay Area real estate market. I find strong evidence that owners facing nominal losses on their housing investments and owners with high LTV ratios sell for higher prices, on average, and the effects are larger than previously thought. I also present new empirical findings that support the theory that down-payment constraints or other institutional details of the mortgage market drive the relationship between LTV and prices. The results have implications for understanding how local housing market variables such as prices and volume are determined in slow markets.

1. Introduction

This paper contributes to the literature on the role of loss aversion and equity constraints in determining how local housing markets operate (Genesove and Mayer, 1997, 2001; Lamont and Stein, 1999; Engelhardt, 2003). Sellers who are averse to selling their house for less than they initially paid face unique incentives when making decisions such as whether and when to sell, and what prices to accept. Those with little or negative equity in their house are also thought to evaluate housing decisions differently given the way that the mortgage market operates. In a market downturn, the effects of loss aversion and equity constraints become more pronounced because more homeowners see their homes depreciate in value. Thus, understanding their effects on homeowner behavior is essential for understanding key features of cold housing markets such as declines in sales volume, a relatively large inventory of unsold homes on the market at any given time, and gradually declining prices. While I discuss other studies that directly address the effects of these constraints on sales volume, this paper revisits the challenge of estimating effects on prices with a richer dataset.

The effect of down-payment constraints on selling behavior is best understood through the following example. Suppose a family has a house that is initially worth $100,000 and an outstanding mortgage of $85,000. The family wants to move for an exogenous reason, and the purchase of a new house requires a minimum down payment of 10%. If housing prices stay the same or increase, the family could sell the house and would likely have enough cash to make a down payment on a new house. However, if prices fall by 10%, the family would only have enough to make a down payment of $5000 (ignoring moving costs), and the family may be better off staying rather than moving.

Alternatively, the family could list their price at an above-average price ("fishing") and hope to eventually match with a buyer who has a relatively high valuation of the house. Of course this strategy would tend to involve keeping the house on the market for longer than average. To the extent that sellers with low equity use this strategy, there should be a negative relationship between list prices and equity for low or negative levels of equity, but not necessarily for higher levels. Sellers with high equity have enough cash to make a down payment, and so if the costs to keeping a house on the market are sufficiently high, these sellers have less of an incentive to fish.

I also discuss and simulate a simple model that generates the same prediction between equity constraints and price, but does not rely on down-payment constraints. The model shows that it is relatively less costly for sellers with low equity, as measured by loan-to-value (LTV) ratios, to wait for higher prices on average because the option to default on their mortgage is relatively more attractive.

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Estimating the effects of potential losses and equity position on prices is difficult because these variables are non-linear functions of unobserved house characteristics. In a seminal paper, Genesove and Mayer (henceforth, GM) address these identification issues using a clever estimation procedure that bounds the true effects of loss aversion and equity constraints. They find an effect of equity position on list and sales prices, and in the lower bound, GM find no statistically significant effect of loss aversion on the sales prices. They do, however, find a significant effect of loss aversion on the list price. Whether loss aversion carries through to the actual transaction prices remains in part an open question. It is possible, as GM note, that since loss aversion is a psychological reluctance to sell, its effect may quickly diminish with learning or exposure to market conditions.

The main contribution of this paper is to use a rich dataset to develop a closely related econometric model that is less parametric than GM, and can *point* identify the effects of loss aversion and equity constraints on actual selling prices in a more diverse sample of housing transactions. Whereas GM estimate their model on a sample of condominium sales, I use a dataset that provides details of every housing transaction that occurred in the San Francisco metropolitan area over a 18 year period. In a first stage, I restrict the sample to houses that sold at least two times during periods when prices were rising rapidly and it is reasonable to assume that sellers do not face potential losses or equity constraints. During these hot markets, the econometric model predicts that unobserved quality of a house only affects prices linearly because the equity constraint and potential loss variables are zeroed out. Thus, I can estimate unobserved quality for this sample of houses using simple panel data estimation methods, where I follow GM in treating unobserved quality as a fixed effect. The estimator that I use is a more flexible version of the repeat sales estimator described in Shiller (1991); I use locally linear regression to allow the time effect to vary by house.

In the second stage I restrict the first stage sample to houses that have an additional sale during the market downturn when equity constraints and loss aversion may affect selling behavior. For the transaction price during the cold market, unobserved quality has the usual non-linear effect that complicates GM's estimation strategy. However, I can recover point estimates of the effects of loss aversion and equity constraints using least squares on the restricted sample, where I substitute the estimate of unobserved quality from the first stage into the model.

As a whole, my results largely support the findings in GM in a larger, more diverse sample of housing transactions. The key difference is that I find larger effects. I find that a seller facing a 10% prospective nominal loss receives a 3.55% higher price, on average, while a seller with a 100% LTV ratio receives a 3.3% higher price than a seller with an 80% LTV ratio, on average.

In addition, I present a number of new findings. I find that the effects of loss aversion and equity constraints are smaller for homes surrounded by similar houses, possibly because competition makes it more difficult for sellers to negotiate higher prices. I also find that transaction prices of foreclosed properties do not display sensitivity to the LTV ratio. This is expected if the theories discussed above are driving the results since the sellers of foreclosed properties do not face the same constraints as the delinquent owner. This result supports the claim that LTV is not proxying for some unobserved characteristic of the home.

I also find that failing to control for loss and LTV in a repeat sales estimator overstates prices that a non-credit constrained seller expects to receive. The results imply that selling prices do not adjust as quickly to deteriorating fundamentals because sellers facing equity constraints and nominal losses are reluctant to set lower prices. This is one explanation for the large inventory of unsold homes in markets where home prices are falling: buyers are unwilling to pay prices that include premiums for loss aversion and equity constraints. In addition, popular home price indexes like Case–Shiller do not capture changes in search behavior that accompany a market downturn, and so an analysis of selling prices alone can understate the severity of a market downturn.

This paper proceeds as follows. Section 2 reviews the related empirical literature, and discusses GM's results. Section 3 discusses the theoretical literature that motivates my empirical strategy and also presents a new theory to motivate the effects of equity position. Section 4 describes my unique dataset and presents summary statistics. In Section 5, I describe my empirical model and discuss how it differs from GM. Sections 6 and 7 present the estimation strategy and the results, as well as a discussion of how my estimates compare to GM, and why they differ in some cases. Finally, Section 8 concludes by summarizing the results and presenting directions for future research.

2. Related literature

The theoretical motivation for an effect of loss aversion on house prices comes from Kahneman and Tversky (1979), who develop prospect theory based on experimental evidence that losses relative to a reference point loom larger than gains. The effect of equity constraints is developed in a theoretical model by Stein (1995), which is the foundation for much of the empirical work. He lays out a model where down-payment constraints make it more difficult for sellers to realize the gains from moving when prices are falling.

My empirical strategy is most closely related to Genesove and Mayer (1997, 2001), who use Stein's theory as motivation to look for reduced form relationships between high LTV ratios, loss aversion, list prices, transaction prices, time on the market, and probability of sale. In their earlier study, they find using data from the Boston condominium market that an owner with a higher LTV ratio sets a higher asking price and has a higher expected time on the market than an owner with proportionately less debt. They also find that if sold, a unit with an LTV of 1 has a sales price that is 4% higher than a unit with an LTV of 0.8, all else equal. The authors find no statistically significant effect on selling prices for LTV values below 80%, consistent with the theory of a threshold effect.

Their findings suggest that equity constrained owners do indeed fish for better prices. Furthermore, they actually obtain higher selling prices, but at a cost: they need to keep their property on the market for longer. While these results are consistent with Stein's theory, they do not necessarily validate it. It is possible that LTV is endogenous and is proxying for unobserved characteristics of the house or unobserved characteristics of the seller that affect prices such as risk aversion or bargaining power.[1] For example, if more risk averse sellers tend to make larger down payments on average and tend to set lower list prices to reduce the risk of not receiving any offers, this would induce a positive relationship between LTV and price. In the empirical section below I discuss how I address this potential endogeneity.

In a follow-up paper, Genesove and Mayer (2001) find that most of the effect of LTV ratios on selling prices, list prices, and time on market is actually explained by nominal loss aversion. They find that sellers who expect to receive less than they originally paid for their property set higher asking prices on average, controlling for the seller's equity position. As described in detail below, GM's estimation strategy cannot point identify the effects of loss on actual prices. In the lower bound, they find that loss has no statistically significant effect on actual selling prices. In the upper bound, they find that a 10% increase in loss is associated with a 1.8% increase in price, all else equal. In both the lower and upper bounds, they find that the effect of increasing LTV from 80 to 100 is only 1.5%.

Engelhardt (2003) investigates the effects on household mobility. Using data from the NLSY on household moves across multiple metropolitan areas in the U.S., Engelhardt finds that nominal loss aversion significantly restricts household mobility, while low equity because of fallen house prices does not. Chan (1997) uses actual

[1] See Arnold (1999) for a model where bargaining power affects prices.