View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by DSpace@MIT

M415

3 9080 02874 5120

no. 09-06

Massachusetts Institute of Technology
Department of Economics
Working Paper Series

WHAT WILL IT TAKE TO RESTORE THE HOUSING MARKET?

William C. Wheaton
Gleb Nechayev

Working Paper 09-06
March 1, 2009

Room E52-251
50 Memorial Drive
Cambridge, MA 02142

This paper can be downloaded without charge from the
Social Science Research Network Paper Collection at
http://ssrn.com/abstract=1356243

Digitized by the Internet Archive
in 2011 with funding from
Boston Library Consortium Member Libraries

http://www.archive.org/details/whatwillittaketo00whea

March 1, 2009

What will it take to restore the Housing Market?

By

William C. Wheaton
Department of Economics
50 Memorial Drive
MIT, E52-252B
Cambridge, MA 02139
wheaton@mit.edu

and

Gleb Nechayev
Vice President, Senior Economist
Torto Wheaton Research
200 High Street, 3rd Floor
Boston, MA -2110-3036
gnechayev@twr.com

Prepared for the Symposium "Housing after the fall" at the University of California, Irvine, California, February 19-20, 2009.

JEL Code: R2. Keyword: Housing

ABSTRACT

This paper examines the causes of the run up in house prices between 1998 and 2006 and the subsequent fall. It is argued that two unique factors have been at work: a true "bubble" in 2nd homes, and a fundamental expansion and now contraction of mortgage credit availability. These "new" factors render traditional econometric forecasting relatively useless in judging where markets will go in the future. Instead the paper relies on theory – suggesting that a recovery in sales and an accompanying reduction in the for-sale inventory are both necessary and sufficient to restore price stability and then growth. The paper shows that the relationships between sales, prices and the inventory are complicated and reviews recent econometric evidence about them. A recovery in prices will require (1) renewed purchases of housing by 1st time buyers as well as investors, (2) several years more of record low construction, and (3) some form of amelioration or resolution of foreclosures.

I. Introduction.

In the last decade, the movement of US house prices has departed dramatically from historical patterns. From 1998 to 2006 prices in many US cities rose between 50% and 100% when adjusted for inflation. Many authors feared a housing "bubble" was in the making [Shiller (2005)] while others argued that loose monetary policy and lower interest rates following the 2001 stock market crash explained the pattern [Himmelberg, Mayer and Sinai (2005)] . Recently, much of this discussion has reversed. In 2007-2008 prices suddenly stopped rising and began falling quite noticeably in virtually all cities. To date (2008q2) the declines have ranged from 5% to 30%. This price decline has for the first time triggered a financial crisis, which in turn is generating a sharp general economic recession. The discussion has now turned to when and how housing prices will stabilize, much less even recover. Given the contamination to the more general economy and financial markets, the question has considerable urgency.

This paper does a number of things to review what we know about the rise in house prices, their subsequent collapse and to investigate when they might stabilize and recover. In particular, the following are addressed.

1). Historically, how has housing moved with the macro-economy and are these relationship merely repeating themselves this time, or has something unique happened?

2). If the run up in prices from 1998-2006, and the subsequent decline was unique and cannot be explained with econometric models, what did cause the movements, and how can future prospects be assessed?

3). Without econometric tools, an estimate of future price movements must be based more on theory. What do we know theoretically about the movement in prices, sales and the vacant inventory of units? Can we use such information to predict the hoped-for recovery?

4). With this approach, what exactly will it take for prices to stabilize and then recover and how likely are these?

The paper is organized as follows. In the next section we briefly review the data on the co-movements of housing and the economy. Then, Section III undertakes an exercise in out-of-sample forecasting to show that the movement in prices over the last

decade is completely unexplained by local and national economic fundamentals. This would seem to render econometric forecasting of little use in assessing the future, so Section IV provides some insight into the "unique" factors working on housing over the last decade. Sections V and VI review how prices are linked closely, but in complicated ways, to housing sales and the for-sale inventory (vacancy). This provides at least a theoretical framework for future predictions. Section VII shows all of (the many) factors that will have to come into play in order for prices to recover, and assesses the likelihood of this occurring.

II. Housing and the Macro Economy.

Any thought that history has been repeating itself recently can be rapidly dismissed with the aid of two graphs. Figures 1 and 2 plot (respectively) new housing construction and price changes against the single best measure of US economic performance – job creation. The plot for construction goes back somewhat further, since reliable price indices (here the CSW 10 City Index is used) have existed only since the early 1970s.

Figure 1: Housing Construction, Job Growth

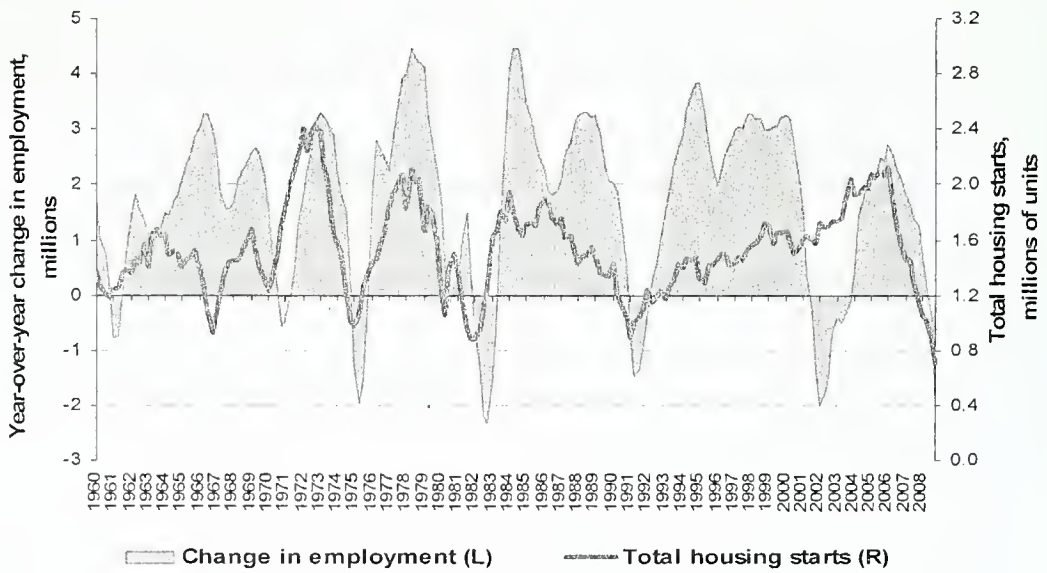
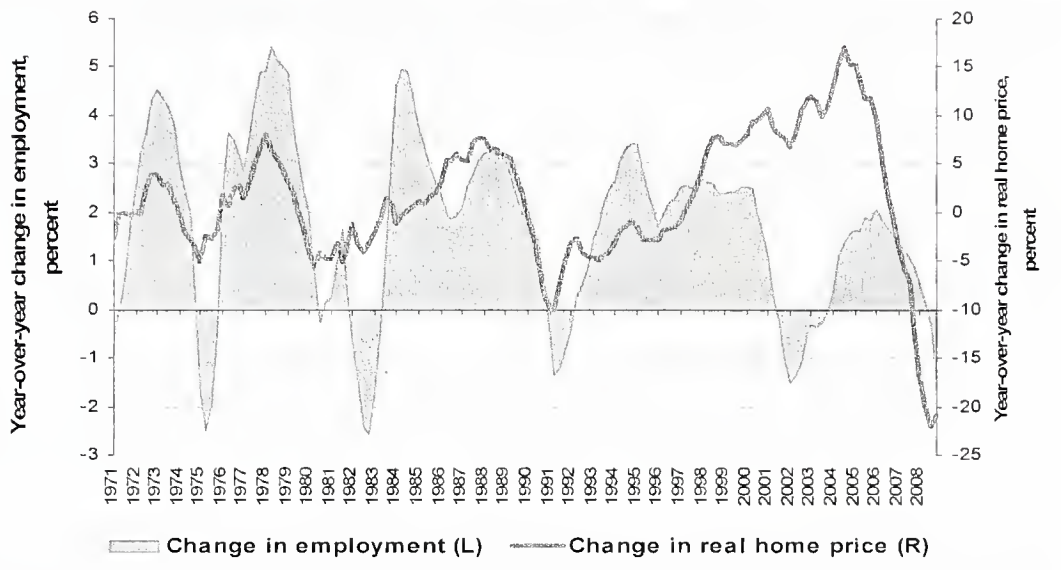


Figure 2: House Price changes and Job Growth



In both figures, movements in housing and the US economy are very closely linked until the around 2000. After that, prices and construction soar for 6 years despite a sharp recession in 2001-2002. After 2007, it is also clear that the down turn in housing leads the economic decline, while in previous recessions housing either followed or was contemporaneous with the broader economy.

III. Can economic fundamentals explain housing prices over the last decade?

While Figures 1 and 2 are suggestive that something new was happening over the last decade they hardly constitute proof. The question of why prices rose and then corrected between 1998 and 2008 needs more than some descriptive analysis of house prices relative to job growth, income, or interest rates. The approach we use here is to

estimate an econometric forecasting model using data only through some date (here 1998:4 is chosen). Then, prices are forecast out-of-sample forward with this model *using the actual 1999-2008 changes in that economic data.* The question is whether the model picks up the rapid rise in prices from 1998-2006 and the decline since? [1]

There is a long literature on house price forecasting models. As recently summarized by Capozza, Hendershott and Mack [CHM, 2004] there is wide consensus that as markets grow in employment, income and population, prices should also increase. There is likewise consensus that they should move inversely to some measure of the cost of capital. Like many authors in the past, CHM apply an Error Correction Model [ECM] approach that uses these variables. The 2-stage ECM approach however has been recently questioned by Gallin [2006], who argues such models should just directly predict prices with the combination of economic variables and lagged prices.

Another more serious criticism of univariate models is that they ignore the supply side of the market. This of course can be handled explicitly by jointly modeling prices and the housing stock with a 2-variable VAR. Early work by Dipasquale and Wheaton [1994] used a structured VAR, while more recent papers by Evenson [2004] and Harter-Dreiman [2004] use unstructured VAR models. Such models also are able to estimate an implied supply elasticity for each market. Glaeser et al.[2005] argues that a declining supply elasticity may have caused prices to rise "excessively" of late – due largely to increased local development regulations. Identifying such changes in supply elasticities is possible however, only if a unique instrument (e.g. "regulation") can be found for the estimated VAR supply equations. [2]

It is important to point out several observations about the supply side of the current housing market. First as shown in Figure 1, the national number of constructed housing units 2006 tied an all time record before collapsing in 2008. The "robustness" of recent supply will become even more apparent when later compared to household

[1] The models could be estimated with data through 2008, but this would create some bias for our experiment. The forecasts of such a model from 1999-2008 would contain the influence of the hypothesized recent "unknown" factors in so far as they are partially correlated with economic fundamentals and hence alter the parameters of the latter .

[2] Malpezzi (1996) has produced such an instrument for measuring regulation, but it is available for only half of our markets, and not over time, and its construction has been the subject of debate.

formation. Thus there is little evidence of at least a national supply "shortage" that might have instigated the recent price inflation.

In an earlier paper, we examined out-of-sample forecasts from 1998 through 2006 – using a wide range of univariate models (Wheaton and Nechayev, 2007). These models all greatly under predicted the increase in prices over those 8 years in 60 MSA – where prices were measured using the widely available OFHEO indices. Here, we will test the forecast ability of a more complicated 2-variable VAR model – with an additional 2 years of valuable data when prices have fallen. We also use a different price series. The 2 variable VAR model is shown in (2) and it includes a similar vector of "conditioning" economic variables (X_t) as did our earlier univariate models. Here Prices are regressed on lagged prices, (current) economic variables and then lagged stocks. The parallel equation regresses stock on lagged stocks, economic variables and then lagged prices. The lags again correct for autocorrelation, and there are well known tests to select the number of lags. For this model system to make sense, the sum of lagged price coefficients in the price equation should be less than 1.0 and similarly for the sum of lagged stock coefficients in the stock equation. One also expects the sum of stock coefficients to be negative in the price equation and the sum of prices to be positive in the stock equation. Finally, it is hoped that the conditioning variables have the signs anticipated by economic theory, but this is not a strict requirement of VAR analysis.

$$\begin{aligned} LogP_t &= \sum_{j=1}^{n} \alpha_j LogP_{t-j} + \beta' LogX_t + \sum_{j=1}^{n} \lambda_j LogS_{t-j} \\ LogS_t &= \sum_{j=1}^{n} \alpha_j LogP_{t-j} + \beta' LogX_t + \sum_{j=1}^{n} \lambda_j LogS_{t-j} \end{aligned} \qquad (1)$$

The model in (1) is implemented using quarterly data from 1979:1 through 2008:2 although our back test truncates the data at 1998:4. The stock data is constructed by taking the 1980 census single family stock and adding on quarterly single family starts.[3] The price data used this time is the 10 city CSW price data that is widely cited and forms the basis for Futures Trades on the Chicago Mercantile Exchange. The CSW indices tend

[3] This ignores unit demolitions, but when demolitions are calculated as the difference between decade census stock counts and cumulative starts, they are virtually nil except for the 1960-1970 interval.

to show a greater decline over the last two years relative to the OHFEO data. The results of estimating the equations are generally quite similar across markets.

The model is estimated individually for each of the 10 MSA markets with the published CSW price data. The included economic conditioning variables are MSA total employment (Empl), total personal income divided by employment (Wage), and the 30 year fixed mortgage rate (Mortg). Experiments using both real and nominal rates were tried with in this instance nominal working better. To illustrate the models and their application in more detail, the estimated equations (described above) for each model are presented Appendix I. Figures 3-5 also present the historic data along with the described out-of-sample forecasts starting in 1999:1 for the markets of Boston, Miami and Los Angeles. These markets illustrate the range of forecast outcomes across the 10 CSW markets. The vertical axis is the log of the real price level.

Figure 3: Boston House Prices

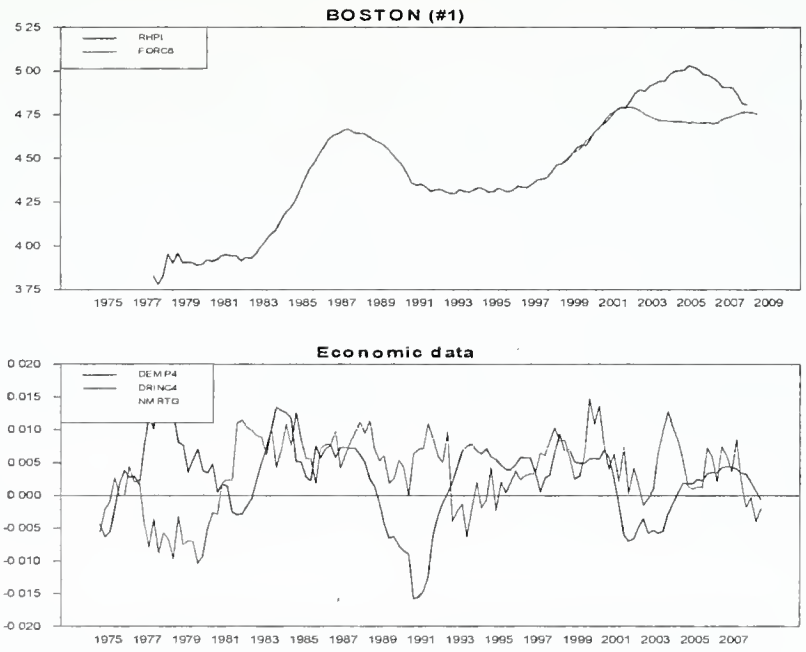


Figure 4: Miami House Prices

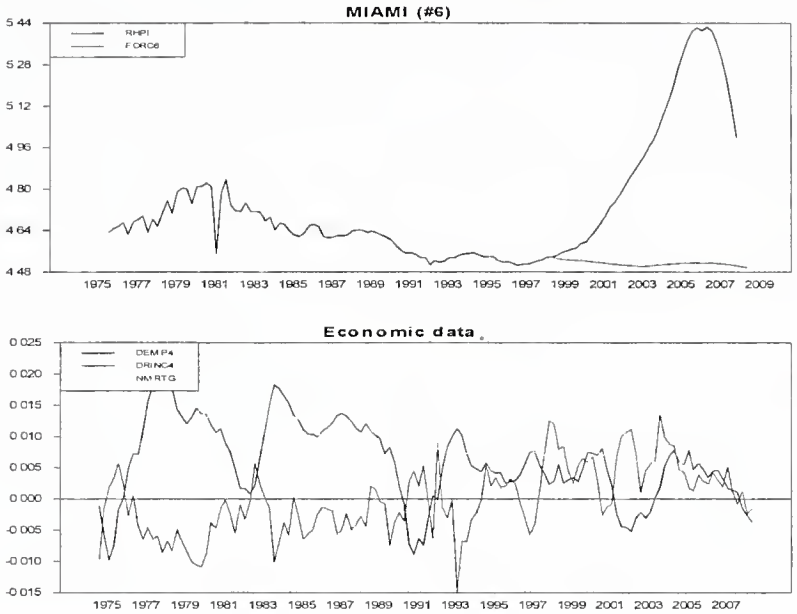
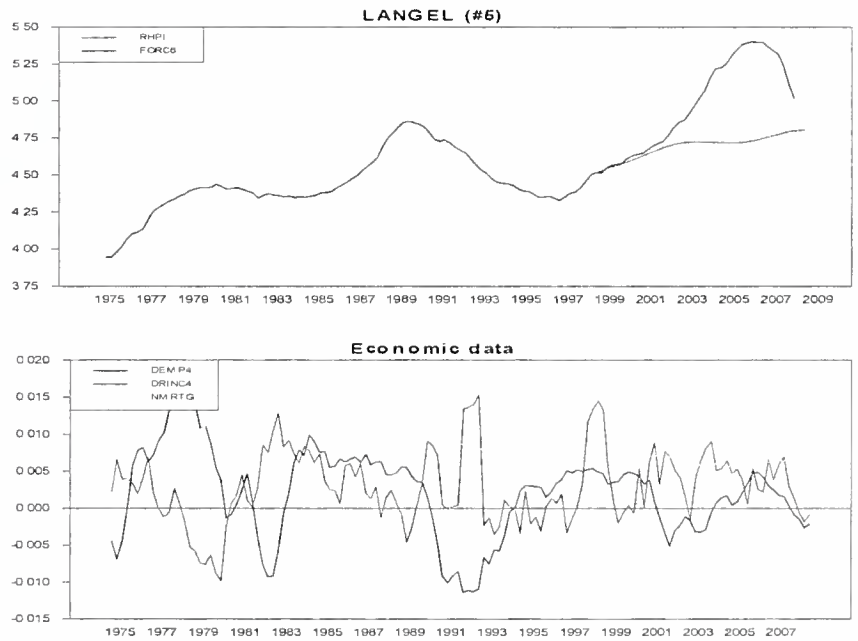


Figure 5: LA House Prices



The case of Boston shows the smallest forecast "miss" (20%). Interestingly the time pattern of the forecast is exactly the opposite of what actually occurred. Rather than following the rise and then fall of actual prices, the model has prices forecast to fall and then recover. The model's forecast in the case of Boston is easily explained, by turning to the economic fundamentals in the second frame of Figure 3. Starting in mid 2001 there is a downturn in the local economy almost as severe as the downturn in 1989-1992 and more severe than that in 1980-1983. Furthermore, the recovery from 2003-2008 is actually less robust than that after the previous two episodes. Finally, the fall in interest rates from 2001-2005 appears no greater than that which occurred in the four years following the previous two recessions. Given these movements in fundamentals, it is easy to understand how the model calls for a correction after 2001 and then mild recovery. The forecasts for Chicago and San Francisco are similar to Boston – each "missing" by comparable magnitudes.

Miami is similar to the only other "resort" market in the CSW10 sample – Las Vegas. In these markets, after years of relatively flat real house prices, a completely unexplained doubling in prices occurs from 2000-2006. Nothing in the economic fundamentals shows any abnormal growth during this period, and after 2006 prices appear to be in free fall.

The third market illustrated, Los Angeles, is similar to New York, San Diego and Washington. In these markets, the "miss" is around 60% - with again far less run up in prices and little forecast correction over the last 18 months. In almost all markets not only are price levels always under forecast, but the pattern of price movements is opposite as well. There is no "up-down" movement, rather only a smoother trend with a "dip".

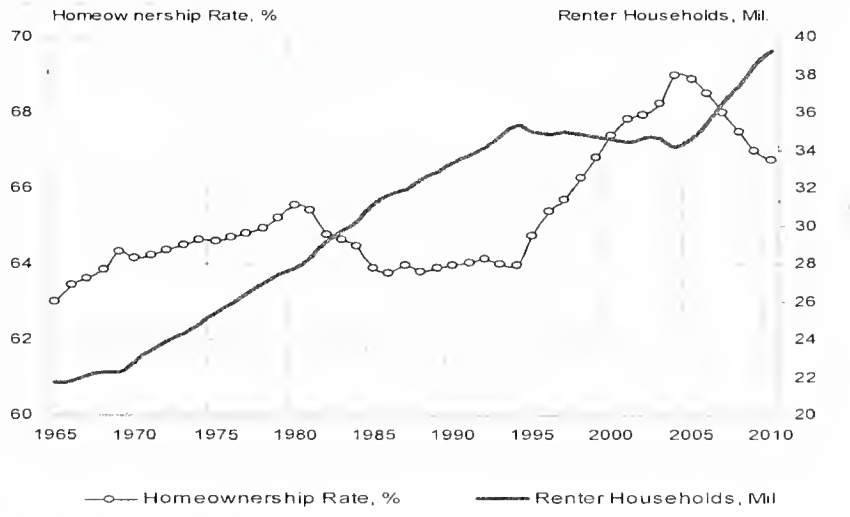
In most, but not all cases, the 2-equation VAR models "work" in the sense discussed previously. Referring to Appendix 1, the sum of lagged price coefficients is less than one in all price equations and the sum of lagged stock coefficients is less than one in the stock equation. The stock coefficients are all negative in the price equation, but significant in only 4 of 10 cases. A puzzle is that the price coefficient in the stock equation is never significant and is negative as often as it is positive. Also, many of the coefficients for the economic variables are not statistically significant and often are of the

"wrong" sign. The ability of the 2 variable VAR to predict the changes of the last decade is really no better than the univariate model results in our earlier study.

IV. The Unique factors over the last Decade.

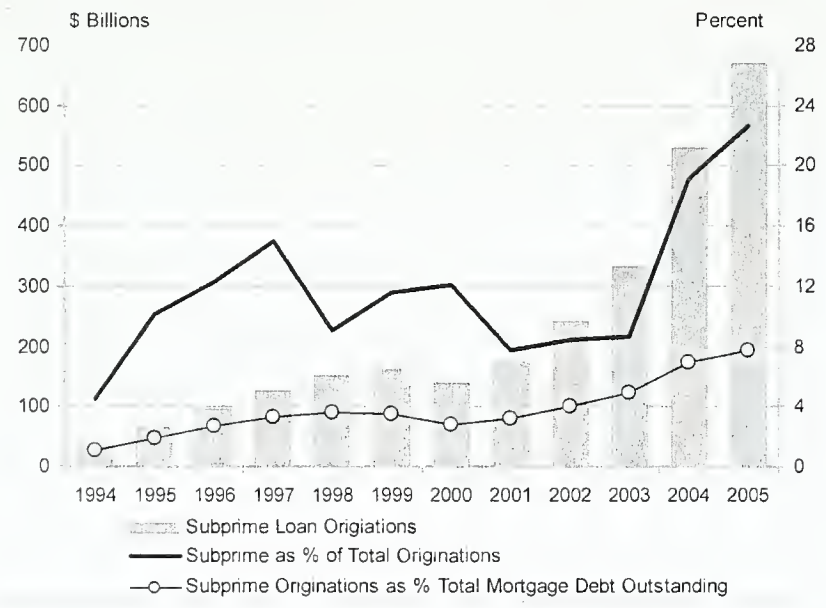
One factor that has changed in the last ten years that could easily explain an unusual growth in prices - is the soaring national rate of homeownership. Between 1965 and 1995 the homeownership rate fluctuated between 62 and 64 percent with little discernable trend. After 1995 it jumped 5 percentage points and at the end of 2006 stood at 69% (Figure 6). Since then it has retreated a full percent – down to 68% - and is expected to fall further. These movements were so pronounced that from 1998-2006 the total number of renters in the US actually declined for the first time since WWII. What this meant is that each year from 1998 to 2006 almost 400,000 renter households switched to owning. A movement in demand this large would certainly be expected soften rents and put great pressure on prices – a pattern Shiller [2005] labels a "bubble". In the 2 years since 2006, the number of renters has grown sharply and the number of owners has actually declined. The question then is what has changed in the last decade to explain these dramatic shifts?

Figure 6: US Homeownership



As discussed in our earlier study, we like many others suspect that the growth in US homeownership and hence prices was driven by an explosive growth in credit availability from the creation of the so-called "sub-prime" lending market. The emergence of this market in the mid 1990s is perfectly timed with the beginning of the sharp rise in US homeownership. Prior to this time, most households with poor credit ratings, or households seeking very aggressive underwriting were simply rationed out of the mortgage market. Since then, "risk-based pricing" provided ample credit in these situations – albeit at significantly higher rates – and often with subordinated loans. There seemed to be no end to investors' appetite for securitized pools of such "risky" loans. By 2005 almost a quarter of all loans originated each year were sub-prime and the stock of sub-prime loans had reached 8% of total US mortgage debt (Figure 7).

Figure 7: Expansion of Mortgage Credit

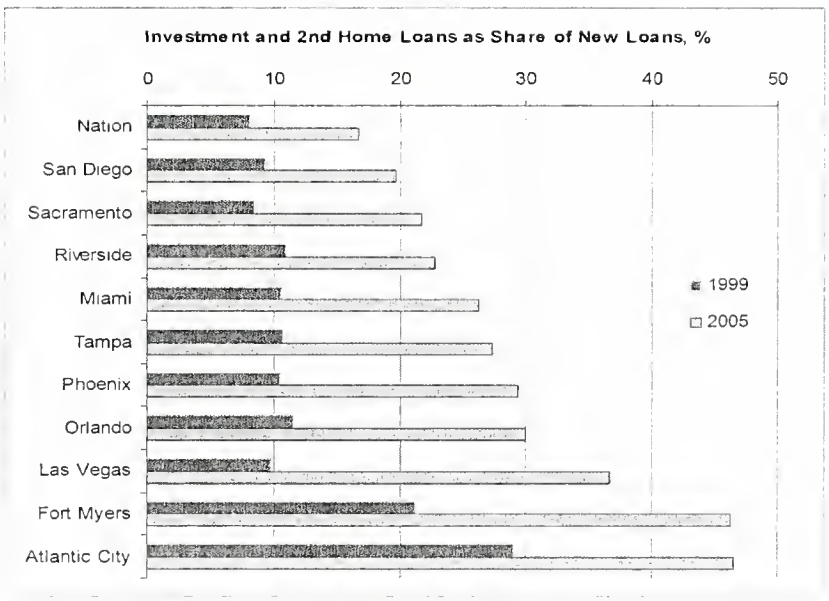


A number of studies have begun to explore the emergence of the Sub-prime credit market. Some have investigated whether pricing adequately reflected the market's higher default rates, others the question of whether lenders were somehow predatory in attracting borrowers. In 2004 a special issue of the Journal of Real Estate Finance and Economics was devoted to this relatively new market. Several more recent studies have

tried to identify geographic differences in the penetration of this type of lending (e.g. Ho and Pennington-Cross [2006]) and borrower self-selection between credit markets (Ben-Shahar [2006]) . Since 2006, the US Subprime market has unraveled and foreclosures have surged [Foote, Gerardi, Willen (2009)]. A recent paper by Wachter and Pavolv (2008) finds that markets where price declines from 2006-2008 are greatest are also those markets with the largest prior-period price increases.

The current housing market has also seen a record number of housing sales to investors and 2nd home buyers. The most direct way to examine such buying is to look at loan origination records (again for home purchases) - wherein the borrower must declare (by law) whether the financing is for purchase of a primary home, 2nd home or investment property. This data is available from Loan Performance Inc. and goes back to the late 1990s. The sum of "investor" and "2nd home" originations as a share of all originations has increased sharply since 1999 (Figure 8). This reported data is also just for 1-4 family units, and the 2nd home share and its growth would likely be greater had condominiums sales been included. In addition, they also miss 2nd home purchases financed with expanded primary home loans or with all-equity.

Figure 8: 2nd Home Purchase Share



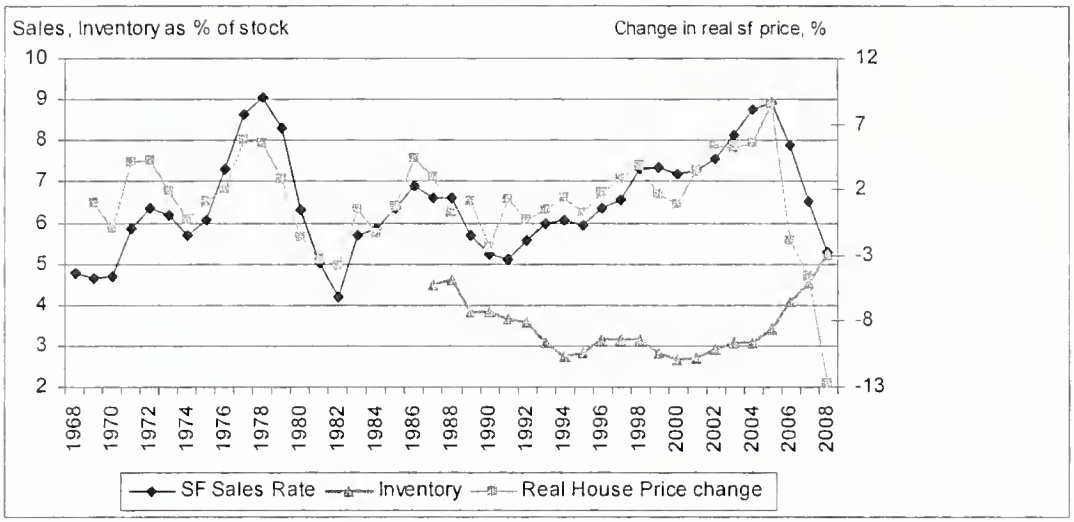
As discussed in our earlier paper, purchases of 2nd homes may explain why prices rose so dramatically over 2000-2006 despite record housing construction and slowing household creation. Someone was purchasing the "excess production". What is important about 2nd homes and investment properties is that such buying can more significantly affect a market's "net supply" or vacancy. Many primary home purchasers make "churn" moves from one house to another – hence a transaction has little impact on market vacancy. A purchase/sale by a 2nd home owner can subtract/add more directly to vacancy.

It is interesting to speculate on the causes of this recent buying trend. Some suggest that it has resulted from baby-boomers "pre-buying" for retirement. Other's offer up that housing became viewed as a "safe investment" relative to stocks and bonds – particularly after the 2001 decline in the stock market. With only aggregate time series, true explanations will be impossible to identify. In our earlier paper, we did show that *across 60 markets* the magnitude of the price forecast error (in 2005) was highly correlated with the level of 2nd home purchasing. Causal inference, however, is again a bit tricky. If residual home prices are rising for some other reason, that could generate investment buying in addition to the converse. There clearly can be joint causality between these variables.

V. What do we know about Prices and Sales and the Inventory?

As shown in Figure 9 below, there is a strong positive correlation between housing sales (expressed as a percent of total owner households) and the movement in housing prices. Likewise there is a strong negative correlation between prices and the inventory. Superficially these relationships seem contemporaneous, and so recovery in prices would seem to go hand in hand with a recovery in sales and drop in inventory. The causal relationship between the variables however is more complicated and so before drawing any conclusions, the relationship between these variables needs to be examined much more carefully. To date there have been several different interpretations of the strong empirical relationship. .

Figure 9: US Housing Sales, Prices, Inventory



In one camp, there is a growing literature of models describing home owner "churn" in the presence of search frictions [Wheaton (1990), Berkovec and Goodman (1996), Lundberg and Skedinger (1999)]. In these models, buyers must always become sellers – there are no entrants or exits from the market. In such a situation the role of prices is complicated by the fact that participants both pay higher prices, but also receive more upon sale. It is only the transaction cost of owning 2 homes (during the moving or trade period) that grounds prices. If prices are high, the transaction cost can make moving so expensive as to erase the original gains from moving. In this environment Nash-bargained prices move almost inversely to expected sales times - where this equals the vacant inventory divided by the sales flow. In these models, both the inventory and sales churn are exogenous. Following Pissarides (2000) if the matching rate is exogenous or of specific form, sales time will be shorter with more churn and prices therefore higher. Hence greater sales cause higher prices. Similarly greater vacancy (inventory) raises sales times and causes lower prices.

There are also a series of paper's which propose a relationship in which changes in prices will subsequently generate higher sales volumes. This again is a positive relationship between the two variables, but with opposite causality. The first of these is

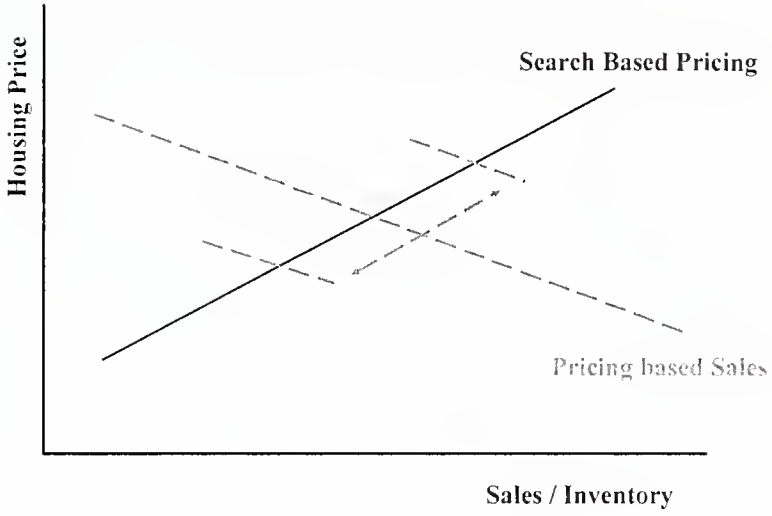
by Stein (1995) followed by Lamont and Stein (1999) and then Chan (2001). In these models, liquidity constrained consumers are again moving from one house to another (market "churn") and must make a down payment in order to purchase housing. When prices decline consumer equity does likewise and fewer households have the remaining down payment to make the lateral move. As prices rise, equity recovers and so does market liquidity. Relying instead on "behavior economics", Genesove and Mayer (2001) and then Englehardt (2003) show empirically that sellers who will experience a loss when they sell tend to set higher reservations than those who will not experience a loss. With higher reservations, the market overall would see lower sales if more and more sellers experience loss aversion as prices continue to drop. As long as prices are rising, however, the theory makes little prediction about what will happen to sales.

In a recent paper, Wheaton and Lee (2009) show convincingly that there are two strong causal relationships in the data - between prices and sales.[4] On the one hand, greater sales "Granger cause" subsequent house prices to rise. This reinforces the theoretical arguments made by search theory. At the same time, higher house prices "Granger cause" *lower* subsequent sales. This is the opposite aggregate relationship from that suggested by the arguments based on liquidity constraints or loss aversion. With these two schedules operating, it must be the case as shown in Figure 10 that the (negative) pricing-based-sales schedule is historically shifting the most – for only then would we observe the strong positive association between sales and prices that we see in Figure 9.

With this in mind, it becomes increasingly clear that the recent run up in sales and prices were likely caused by a significant rise (or outward shift) in the negative "pricing-based-sales" schedule. Subsequently the fall in prices likely results from an inward shift in the schedule. This makes it quite important to more clearly understand the exact determinants of this schedule and how it might shift in reaction to exogenous factors.

[4] Wheaton and Lee (2009) base their conclusions on the analysis of a large panel of 101 MSA housing markets over 25 years.

Figure 10: Sales-Price Relationships



VI. Why do High Prices discourage Sales?

Looking forward, shifting the negative "pricing-based-sales" schedule (outward) would certainly restore both sales and prices to the housing market, but without a better understanding of the underlying determinants of this schedule, assessing the likelihood of this is difficult at best. Hence our original question "what will it take" cannot be answered. To better get a handle on what generates such a downward schedule, we reproduce the following analysis of the 2001 AHS – again from Wheaton and Lee (2009). Figure 11 charts out all of the gross housing flows in that year.

As discussed previously, much of the theoretical literature on sales and prices investigates how existing homeowners behave as they try and sell their current home to purchase a new one. This flow is often referred to as "churn". To fully determine all of the other flows in the housing market, we must do a bit of interpolation using the various questions that the AHS asks of its respondents (current household heads). In "Table 10"of the Survey, respondents - who moved within the last year - are asked what the tenure was of the residence previously lived in. The total number of movers in this question is the same as the total reported in "Table 11" – asking about the previous status of the current household head (respondent). In "Table 11" it turns out that 25% of current renters

moved from a residence situation in which they were *not* the head (leaving home, divorce, etc.). The fraction is a smaller 12% for owners. What is missing is the joint distribution between moving by an existing head and becoming a head. The AHS is thus not able to fully identify how many current owners (for example) moved either a) from another unit they owned b) another unit they rented or c) purchased a house as they became a new or different household.

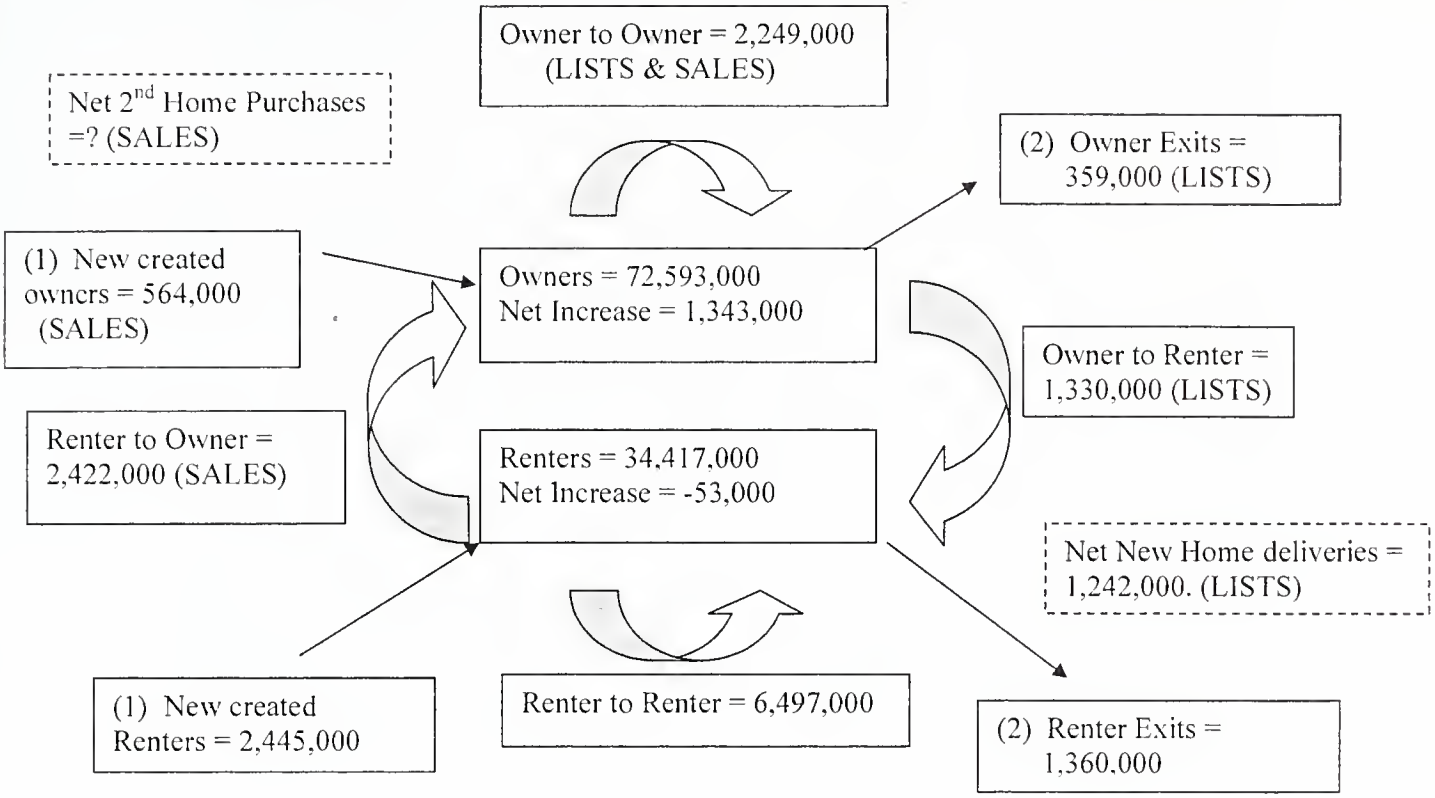
To generate the full set of flows, we use information in "Table 11" about whether the previous home was headed by the current head, a relative, or an acquaintance. We assume that all current owner-movers who were newly created households - were counted in "Table 10" as previous owners. For renters, we assume that all newly created renter-movers were counted in "Table 10" in proportion to renter-owner households in the full sample. Finally, we use the Census figures that year of the net increase in each type of household and from that and the AHS move data are able to identify household "exits" by tenure. Gross household exits occur mainly through deaths, institutionalization (e.g. nursing home) or marriage.

Focusing on just the owned housing market, the AHS also allows us to account for virtually all of the events that add to the inventory of houses for sale (identified in Figure 11 as LISTS) and all of those transactions that remove houses from the inventory (identified as SALES). There are two important exceptions however, and these are identified in Figure 11 with dashed boxes. In 2001 the Census reports that 1,242,000 total units were delivered to the for-sale market. Since we have no direct count of demolitions[5] we use that figure also as net and it is counted as additional LISTS. The second is the net purchases of 2nd homes, which count as additional SALES, but about which there is simply little data[6]. In theory, LISTS – SALES should equal the change in the inventory of units for sale. These relationships are depicted in Figure 2 and can be summarized with the identities in (1) below (2001 values are included).

[5] The growth in stock between 1980-1990-2000 Censuses closely matches summed completions suggesting negligible demolitions over those decades. The same calculation between 1960 and 1970 however suggests removal of 3 million units.

[6] Net second home purchases might be estimated from the product of: the share of total gross home purchases that are second homes (reported by Loan Performance as 15.0%) and the share of new homes in total home purchases (Census, 25%). This would yield 3-4% of total transactions or about 200,000 units. There are no direct counts of the annual change in 2nd home stocks.

Figure 11: US Housing Gross Flows (2001)



SALES = Own-to-Own + Rent-to-Own + New Owner [+ 2nd homes] = 5,281,000

LISTS = Own-to-Own + Own-to-Rent + Owner Exits + New homes = 5,179,000

Inventory Change = LISTS – SALES

Net Owner Change = New Owners – Owner Exits + Rent-to-Own – Own-to-Rent

Net Renter Change = New Renters – Renter Exits + Own-to-Rent – Rent-to-Own (1)

The only other comparable data is from the National Association of Realtors (NAR), and it reports that in 2001 the inventory of units for sale was nearly stable. The NAR however reports a higher level of sales at 5,641,000. This 7% discrepancy could be explained by repeat moves within a same year since the AHS asks only about the most recent move. It could also represent significant 2nd home sales which again are not part of the AHS move data.

What is most interesting to us is that almost 60% of SALES involve a buyer who is not transferring ownership laterally from one house to another. *So called "Churn" is actually a minority of sales transactions.* The majority of transactions, various inter-tenure SALES, also are the critical determinants of change-in-inventory since "churn" sales do not affect it.

The 60% of sales created by non-churn would all seem to be events that one might expect to be sensitive (negatively) to housing prices. When prices are high presumably formation of newly created owner households might be discouraged or at least deflected into renting. Likewise moves which involve changes in tenure from renting to owning also should be negatively sensitive to house price levels. We are agnostic about the determinants of 2nd home buying, but the other decisions simply involve questions of affordability.

Figure 11 provides a more complete picture of the US housing market and offers an explanation for the two schedules between sales and prices depicted in Figure 10. The positive sales-based-pricing schedule is the result of owner-to-owner moves, as discussed in search based models of housing. The downward schedule represents the net effect of inter-tenure moves. Along that schedule, when prices are high SALES decline as net entrants into ownership contract. At the same time LISTS grow and so does the inventory.

VII. A Road to Price Recovery

The discussion above indicates that for prices to recover sales have to grow and the inventory has to shrink. There are however, many channels through which this can occur. First, rent-to-own moves have to increase and own-to-rent moves decline. Ameliorating foreclosures clearly helps here. Second, investor and 2nd home buying has to pick up. Third, new home deliveries have to decline (possibly even further) and also stay low for some period of time. Finally, if vacant units can be converted from owner-for-sale to vacant-for-rent (this is another form of investor purchase) the inventory is again reduced. All of these would help to shift the downward schedule in Figure 10 outward. In addition, we might imagine that once the recession ends, consumer confidence returns, and that owner-to-owner churn will also pick up. This however is

already represented by movements *along* the upward "sales-based-pricing" schedule rather than a shift in that schedule. In Table 1 below, we have tried to add up these factors to examine how the inventory for sale might respond.

The first two columns of Table 1 present historical values for 2001-2005 and 2006-2008. Some of the figures involve extrapolation to fill in the end of year 2008 numbers. The Table also indicates when numbers are estimated or assumed. The columns headed "Estimate" give plausible outlooks for each of the next three years. In 2009, we assume that the recession continues. This generates record low rates of new construction, together with continued demolitions. On the demand side, foreclosures are assumed to be almost as bad as 2008, although this also generates considerable own-to-rent unit conversions. Second home demand is expected to pick up a bit as households shop for bargains in Southern and Western markets.

In 2010 the economy bottoms and begins a slow recovery. Construction remains low, however. Household formation picks up a bit and foreclosures are now far lower. This is likely to be the year when 2nd home purchases are highest as prices will be at a bottom. By 2011, foreclosures have stopped and the net own-to-rent flow is assumed to be neutral (stable homeownership rate). Non occupier demand starts to trail off since much of that inventory has been absorbed in the previous 2 years. Finally, new construction begins to increase, although it is still way below the levels needed to sustain long term demand.

The entries in the final three rows in Table 1 – before the total inventory change is calculated – all represent guesses (these are noted with asterisks). Demolitions often have been assumed to be .25% of the stock – or around 200,000 units yearly (Harvard JCHS, 2006). These estimates however are not based on any hard data from demolition permits – rather (as discussed in note 3) they are residual calculations from the AHS sample numbers on households, and vacancy, compared to stock numbers constructed from summed new completions. Such a residual for owned housing then actually also includes conversions. To separate the two, here we assume that conversions are 60% of the net inter-tenure flows. Some fraction like this must have occurred, for inter-tenure flows have been too large in the last decade relative to vacancy rate changes and stock growth. Finally, net 2nd home sales (as opposed to churn) is estimated based on the following:

15% of all gross sales are of this type (Loan Performance, Figure 8) and 25% of gross sales involve a new home purchase. We do not know how many new homes were actually absorbed by 2nd home buyers, or the net change in the 2nd home stock.

Table 1: Inventory Reduction Forecasts

	Average Annual Change, Ths				
	2001-2005	2006-2008	Estimate		
			2009	2010	2011
Total households	1,015	1,070	900	1,000	1,100
Owner Households (-)	1,030	360	-190	480	740
due to overall growth	680	720	610	680	740
due to changes in homeownership rate	350	-360	-800	-200	0
Total completions	1,730	1,530	450	550	850
Completions for Sale (+)	1,460	1,310	315	385	595
Demolitions*(-)	200	220	200	225	175
Net conversions from rent to own*(+)	210	-215	-500	-120	0
Non-Occupier Demand* (-)	200	235	250	300	150
Change in For Sale Inventory	**240**	**280**	**-445**	**-740**	**-470**

As of the end of 2008, the for-sale inventory stood at about 4.1 million units as compared to 2.4 million during much of the period from 1995 through 2001. This latter level of inventory together with brisk sales of course caused prices to rise quite significantly – in real terms. From our analysis it looks like a reduction in the inventory to 3.2 million would be sufficient to at least restore price stability. Hence at the annual reductions in Table 1, it appears that prices will probably bottom some time in 2010 and rise in 2011, possibly even above inflation. Of course, several factors might hasten this recovery. These would include a more dramatic increase in 2nd home sales, or policies from the new Administration that either ameliorate foreclosures, or alternatively policies that facilitate the flow of units quickly back into the rental market. It is also becomes clear how keen a role supply plays in these scenarios. Without continued severely depressed new construction, together with conversions and demolitions, a recovery will be slower. In either case recovery does not appear "right around the corner", nor of course can the decline in prices continue indefinitely.

References

Ben-Shahar, D. 2006, "Screening Mortgage Default Risk: A Unified Theoretical Framework", *Journal of Real Estate Research*, 28, 3, 215-241.

Berkovec, J.A. and Goodman, J.L. Jr., 1996, "Turnover as a Measure of Demand for Existing Homes", *Real Estate Economics*, 24 (4), 421-440.

D. Capozza, P. Hendershott, C. Mack, 2004, "An Anatomy of Price Dynamics in Illiquid Markets: Analysis and Evidence from Local Housing Markets," *Real Estate Economics*, 32, 1 , 1-21.

Chan, S., 2001, "Spatial Lock-in: Do Falling House Prices Constrain Residential Mobility?" *Journal of Urban Economics*, 49, 567-587.

Denise DiPasquale, William Wheaton, 1994, "Housing Market Dynamics and the Future of House Prices", *Journal of Urban Economics, 35*.2 , 1-27.

Engelhardt, G. V., 2003, "Nominal loss aversion, housing equity constraints, and household mobility: evidence from the United States." *Journal of Urban Economics*, 53 (1), 171-195.

Evenson, Bengte, 2004, "House Price Variation across Local Markets: a supply side view", University of Nevada at Las Vegas.

Christopher Foote, K. Gerardi, Paul Willen. 2008, "Negative Equity and Foreclosure: Theory and Evidence, Federal Reserve Bank (Boston).

Joshua Gallin, 2006, "The Long Run Relationship between House Prices and Income...", *Real Estate Economics,* 34.3 , 417-439.

Genesove, D. and C. Mayer, 2001, "Loss aversion and seller behavior: Evidence from the housing market." *Quarterly Journal of Economics*, 116 (4), 1233-1260.

E. Glaeser, J. Gyrouko, 2005, "Why Have Housing Prices Gone Up?", NBER Working Paper 11129.

J. Harding, S. Rosenthal, C.F. Sirmans, 2007, "Depreciation of Housing Capital, Maintenance, and House Price Inflation", *Journal of Urban Economics*, 61, 2, 567-587.

Michelle Harter-Dreiman, 2004, "Drawing Inferences about Housing Supply Elasticity from house price responses to income shocks", *Journal of Urban Economics, 55*, 2 , 316-337.

Harvard Joint Center for Housing Studies, 2006, "America's Rental Housing", (Cambridge, Mass).

C. Himmelberg, C. Mayer, T. Sinai, 2005, "Assessing High House Prices: Bubbles, Fundamentals and Misperceptions" (Columbia University).

G. Ho, A. Pennington-Cross, 2006, "The Impact of Local Predatory Lending Laws on the Flow of Sub-prime Credit", *Journal of Urban Economics,* 60.2 , 210-229.

Lamont, O. and Stein, J., 1999, "Leverage and House Price Dynamics in U.S. Cities." *RAND Journal of Economics*, 30, 498-514.

Per Lundborg, and Per Skedinger, "Transaction Taxes in a Search Model of the Housing Market", *Journal of Urban Economics,* 45, 2, 385-399.

Malpezzi, Stephen, 1996, "Housing Prices, Externalities, and Regulation in US Metropolitan Areas", *Journal of Housing Research*, 7(2), 209-241.

Pissarides, Christopher, 2000, *Equilibrium Unemployment Theory*, 2nd edition, MIT Press, Cambridge, Mass.

R. Shiller, March 2006, "Long-Term Perspective on the Current Boom in Home Prices", Berkeley Electronic Press.

M. Staten, A. Yezer, 2004, "Issue Introduction, Subprime Lending: Empirical Studies", *Journal of Real Estate Finance and Economics,* 29, 4,1-18.

Stein, C. J., 1995, "Prices and Trading Volume in the Housing Market: A Model with Down-Payment Effects," *The Quarterly Journal Of Economics*, 110(2), 379-406.

Wachter, Susan, Andre Pavlov, December 2008,"Subprime Lending and Real Estate Markets". University of Pennsylvania (Law and Economics research paper 08-35).

Wheaton, William, and G. Nechayev, 2007, "The 1998-2005 Housing 'Bubble' and the current Correction", *Journal of Real Estate Research*, 33,1, pp 1-26.

Wheaton, William, and N.J. Lee, 2009, "Housing Prices and Housing Sales: Empirics and Theory", Paper presented at the 2009 AEA Meetings, San Francisco, Ca.

Wheaton, W.C., 1990, "Vacancy, Search, and Prices in a Housing Market Matching Model," *Journal of Political Economy*, (1990) 98, 1270-1292

Appendix I

Table 3. VAR Model of Real Home Prices

	Independent Variables - Coefficients							LRHPI (peak)	
Market	Const	∑Price	∑Stock	Empl	Wage	Mortg	R^2	Actual	Forecast
Boston	**21.18**	**0.87**	**-1.86**	**0.30**	**0.61**	**-5.67**	0.9957	4.94	4.70
Chicago	1.51	**0.89**	-0.03	-0.20	**0.26**	**-6.12**	0.9853	4.91	4.58
Denver	**4.34**	**0.90**	**-0.43**	**0.27**	0.07	**-5.44**	0.9860	4.71	4.15
Las Vegas	-0.10	**0.81**	0.15	-0.08	-0.13	4.46	0.8838	5.24	4.53
Los Angeles	-1.36	**0.91**	0.04	0.10	0.07	0.70	0.9947	5.38	4.75
Miami	**3.60**	**0.78**	**-0.27**	**0.11**	**0.08**	-0.25	0.9622	5.42	4.51
New York	18.11	**0.95**	**-1.21**	0.03	0.11	**-5.05**	0.9957	5.15	4.42
San Diego	-0.61	**0.92**	-0.03	0.12	0.11	5.05	0.9857	5.28	4.77
San Francisco	1.64	**0.91**	-0.15	0.02	0.15	-1.25	0.9890	5.15	4.84
Washington DC	**1.48**	**0.95**	**-0.21**	0.06	**0.31**	**-1.99**	0.9925	5.27	4.77

Table 2. VAR Model of Housing Stock

	Independent Variables - Coefficients						Centr
Market	Const	∑Stock	∑Price	Empl	Wage	Mortg	R^2
Boston	0.0434	**0.9970**	0.0016	0.0003	-0.0027	-0.0526	0.9999
Chicago	**0.2869**	**0.9711**	-0.0006	**0.0195**	-0.0032	-0.0762	0.9996
Denver	**0.1514**	**0.9832**	0.0012	**0.0072**	0.0065	-0.1834	0.9999
Las Vegas	**0.3421**	**0.9616**	-0.0046	**0.0321**	-0.0051	0.1655	0.9999
Los Angeles	**0.0956**	**0.9877**	-0.0009	**0.0088**	0.0050	-0.0525	0.9999
Miami	0.1997	**0.9727**	0.0015	**0.0207**	0.0053	0.2050	0.9998
New York	0.3125	**0.9761**	0.0004	**0.0053**	0.0018	-0.0350	0.9999
San Diego	0.1892	**0.9729**	0.0003	**0.0169**	0.0163	-0.1177	0.9999
San Francisco	**0.2137**	**0.9822**	0.0011	0.0020	0.0019	-0.0459	0.9999
Washington DC	**0.1627**	**0.9757**	-0.0029	**0.0239**	0.0027	**0.1922**	0.9999