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Momentum Traders in the Housing Market: Survey Evidence and a Search Model*

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ABSTRACT

This paper studies household beliefs during the recent US housing boom. To characterize the heterogeneity in households' views about housing and the economy, we perform a cluster analysis on survey responses at different stages of the boom. The estimation always finds a small cluster of households who believe it is a good time to buy a house because house prices will rise further. The size of this "momentum" cluster doubled towards the end of the boom. We also provide a simple search model of the housing market to show how a small number of optimistic investors can have a large effect on prices without buying a large share of the housing stock.

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I. Introduction

This paper studies household beliefs during the recent US housing boom. The first part presents evidence from the Michigan Survey of Consumers. To characterize the heterogeneity in households' views about housing and the economy, we perform a cluster analysis on survey responses at different stages of the boom. The estimation always finds a small cluster of households who believe it is a good time to buy a house because house prices will rise further. The size of this "momentum" cluster strongly increased towards the end of the boom. The second part of the paper provides a simple search model of the housing market to show how a small number of optimistic investors can have a large effect on prices without buying a large share of the housing stock.

The raw survey data suggest that the housing boom had two distinct phases. During the early boom years 2002-3, a large and increasing fraction of households believed that the time for buying a house was good. This fraction peaked at 85.2 percent in 2003:Q2. The most important reason – cited by up to 72 percent of households – was favorable credit conditions. At the same time, by these measures, enthusiasm about housing and credit was actually slightly weaker than at previous peaks during the last 25 years.

In a second phase of the boom, during 2004-2005, overall enthusiasm about housing and credit was already waning, and houses were increasingly viewed as "too expensive." However, the number of agents who believed that prices would go up further increased from 10 percent in 2003:Q4 to over 20 percent in 2005:Q2, a 25 year high. It thus appears that the boom was initially driven by a familiar force, namely good credit conditions. What was unusual about the recent boom is the increased belief in rising prices, which occurred precisely at the time when prices rose to their historical highs.

To look for clusters of opinions on housing and the economy, we estimate a mixture density on survey responses to questions about housing, business conditions, inflation and interest rates.

Conditional on a cluster, survey responses are assumed to be independent across questions. The role of the clusters is to introduce correlation – they may capture common "views of the world" that are reflected in the responses to many questions. In the estimations for both phases of the boom finds one "gloomy" cluster and two optimistic clusters whose optimism reflects credit conditions and house price expectations, respectively.

The second part of the paper considers the role of a small number of optimistic traders on house prices. For the stock market, there is a standard argument for why even a small number of optimists can push up prices in the presence of short-sales constraints (Miller 1977). Indeed, if investors are risk neutral and have unlimited wealth, and if stock cannot be sold short, then the competitive equilibrium price reflects the subjective valuation of the most optimistic investors in the market. Those investors use their wealth to buy up all stocks in equilibrium. Less optimistic investors would like to short stock, but are constrained from doing so. As a result, they simply sell all stock to optimists at inflated prices.

While the standard argument is plausible for segments of the stock market where shorting is difficult (such as recent IPO shares), it does not work for the housing market: we do not observe a small number of optimistic speculators buying up all houses. One likely reason is that transaction costs are much higher in the housing market. Moreover, unlike stocks, houses are not standardized assets traded in highly competitive markets. Instead, households search for individual houses that suit them and bargain with sellers over the price. Once they have found a suitable house they cannot easily exchange it for another equivalent house.

The fact that optimists cannot easily buy many houses might suggest that they have a smaller effect on the price.[1] However, in a search market, the recorded price reflects only the transactions that actually take place. What matters for a boom is thus not optimists' share of total market

[1] In fact, if agents in the simple (frictionless) competitive model are constrained to hold one house per person, then a small number of optimists does not move the price: for the market to clear, there must be as many buyers as houses.

capitalization, but optimists' share in the volume of transactions. In the housing market, a market where volume is much lower than in the stock market, optimists can drive up the price while spending much less wealth and obtaining a far smaller market share. In Section 3 below we use a simple search model to illustrate the relationship between the number of momentum investors, transaction costs, volume, and prices.

II. Housing Boom and Reasons for Buying a House

The top panel in Figure 1 shows the price-dividend ratio for housing: the aggregate market value of residential real estate in the United States (from the Flow of Funds) divided by NIPA expenditures on housing services. The ratio fluctuates around its average of 16 during the 1980s and 1990s, stays consistently above average after 2002, and peaks in early 2006. The market value of homes is determined by collecting recent transaction prices and applying them to similar homes that have not been on the market for a while. Importantly, the number of transactions in the housing market is much smaller relative to the number of outstanding homes than in other asset markets. According to the American Housing Survey, 6 percent of owner-occupied homes are traded per year. In contrast, on the New York Stock Exchange, annual volume divided by market capitalization is 120 percent.

How did households view the recent boom in the housing market? The Michigan Survey of Consumers asks "Generally speaking, do you think now is a good time or a bad time to buy a house" The fraction of households who answered "now is a good time" is plotted in the lower panel of Figure 1. Many of its fluctuations reflect the business cycle. In the recent boom, it peaked at 85.2 percent in 2003:Q2, about two years before the peak of the boom. Interestingly, enthusiasm about housing during the recent boom was not unusual when compared to previous peaks.

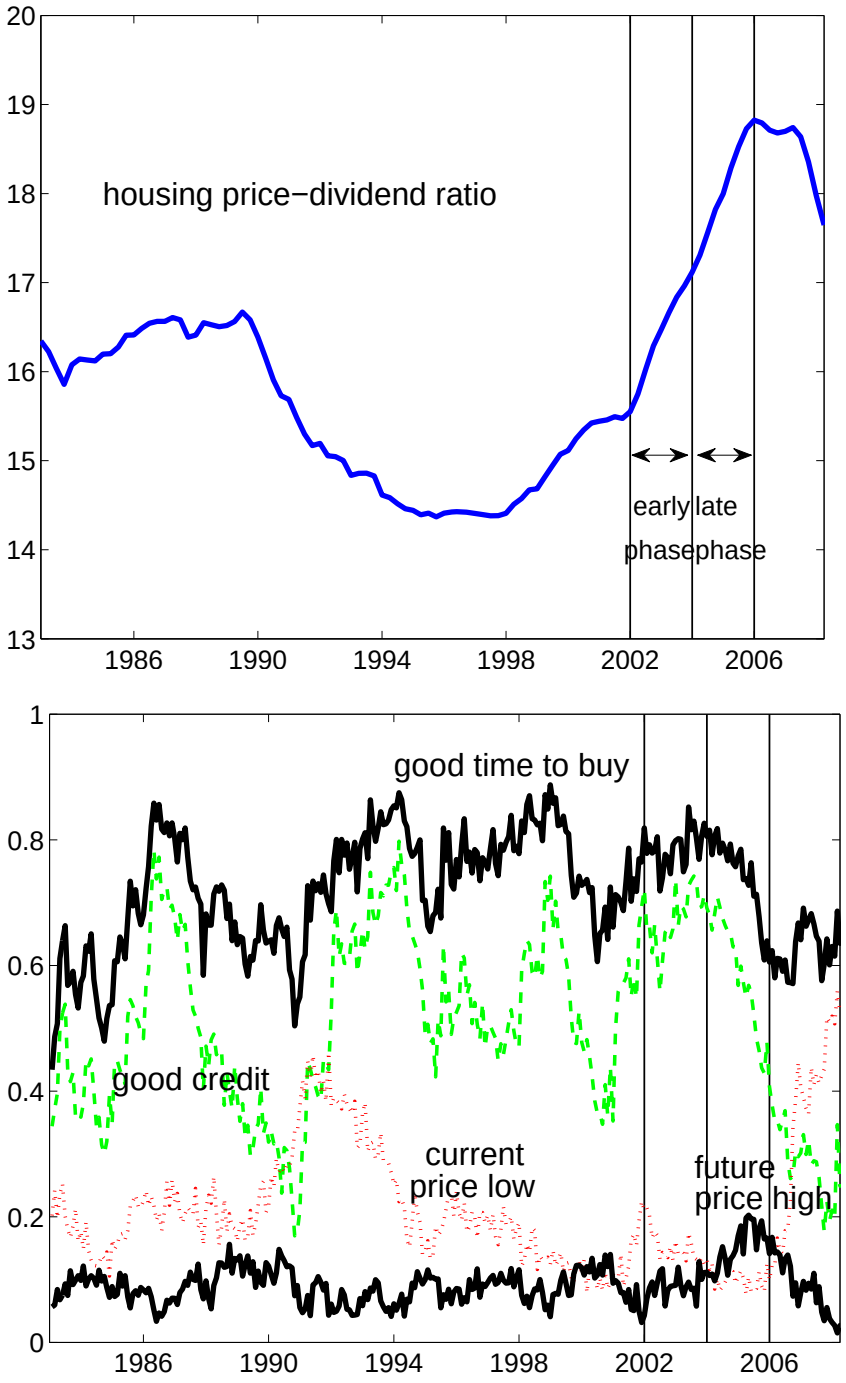

Figure 1. Top panel: Housing price-dividend ratio for the United States. Bottom panel: Fraction of households who express the indicated views about housing in the Michigan Survey of Consumers.

In a follow-up question, households are asked "Why do you say so?" Households are asked to give up to two reasons, and about one half of households cite two reasons. The question is open-ended and the data contain many different reasons cited by survey respondents. We group

responses by three issues: current credit conditions, the current level of house prices, and the expected future change in house prices. In their responses, households point to issues as either good or bad for buying a home – for example, a response could be "it is a good time to buy because credit is cheap," or "it is a bad time to buy because credit is hard to get."

We define a household's view of an issue as positive or negative according to its implications for buying a house: for example, the household has a positive view of current prices if he cites low prices as a reason for buying, and he has a positive view of the expected change in prices if he cites rising prices as a reason for buying. We say that the household has no view if he does not cite a reason related to the issue, which suggests that he does not believe the issue to be important. Figure 1 plots, for each issue, the fraction of households who have a positive view.

Many households express the view that credit conditions are good (by citing reasons such as "interest rates are low," "credit is easy to get"). The figure shows that credit conditions have always been a major driver of households' overall thinking about housing, not only in the recent housing boom. At the beginning of the recent boom, around 20 percent of households express the view that current house prices are low. This fraction later declined as house prices rose.

The third issue is the expected change in house prices. Here positive answers include, for example, "house prices are going up," "capital appreciation," and "housing is a good investment." On average, 9.2 percent of households are optimistic about future house prices. Figure 1 also shows that, starting in 2004, more and more households became optimistic *after* having watched house prices increase for several years. The percentage of these *momentum traders* rose to a 25 year high of 20.2 percent in 2005:Q2.

The goal of cluster analysis is to understand whether household survey responses can be described by a small number of "types" who share similar views about the economy. We pick six variables. First, we consider responses to three questions about households' expectations of business conditions, interest rates, and inflation one year ahead. The answers can be "higher/better,"

"lower/worse," or "same." Second, we include the views about credit and house prices, as derived above by recoding the reasons households give for their view about housing.

Table 1 presents parameter estimates for a mixture density with three clusters. Households are drawn into a cluster with a cluster probability, which also represents the share of the cluster in the population. Conditional on a cluster, survey responses are assumed to be independent across households and questions. The probabilities of each response are constant within clusters but different across clusters.

The estimated clusters are similar in both phases of the boom. There is always one cluster – cluster 1 in both panels of Table 1 – that contains households who are "gloomy" both about future economic growth and about housing. Table 1 shows that, in the early phase of the boom, only 31 percent of households in cluster 1 forecast higher growth, compared to roughly 45 percent in the other clusters, and this fraction further declines to 19 percent in the late phase of the boom.

A second cluster consists of households who are positive about housing because they believe that credit conditions are good and current house prices are low. A third cluster essentially picks out the momentum traders – households who are positive about housing because they expect house prices to rise. These agents end up in a cluster by themselves since they care much less about credit and the level of house prices. In the late phase of the boom, the "momentum" cluster is larger. Interestingly, there are no systematic differences between clusters in terms of beliefs about interest rates and inflation. However, enthusiasm about housing always goes along with optimism about economic conditions.

In terms of demographics, momentum traders are not strongly different from the rest of the population. They are somewhat older and richer, more likely to be male and have a college degree, and have fewer children. However, as is common in the literature, demographic characteristics explain little of the variation in beliefs (e.g., in a multinomial logit regression, the pseudo-R^2 is essentially zero).

III. Optimists in a Search Model of the Housing Market

We consider a simple search model of the housing market, inspired by the contributions of William Wheaton (1990) and John Krainer (2001). The goal is to illustrate how a small number of optimists can drive up the average transaction price without a large increase in trading volume or in their market share.

Setup.

Time is continuous and there is a continuum of infinitely-lived households of measure 1. Households care for two goods. Numeraire consumption can be purchased in a frictionless spot market. Housing services are derived from indivisible housing units that must be bought in a search market. Households may own at most one house. Utility is quasilinear in housing and other consumption, and households discount the future at the constant rate r.

We introduce preference shocks to capture typical reasons for moving that are unrelated to price dynamics, such as changing jobs. In particular, when a household purchases a house, he is initially a "happy owner" who obtains housing services at the rate v. However, he may be hit by a shock that makes him an "unhappy" owner who no longer obtains any services from the house. He can then sell the house and purchase a new one to again begin obtaining housing services. The preference shock that makes a household unhappy is driven by a Poisson process with arrival rate η. A household thus receives a moving shock on average every $1/\eta$ years.

At any point in time, there are at most three types of agents in the economy. Let μ_H and μ_U denote the number of happy and unhappy owners, respectively, and let μ_R denote the number of "renters" who do not own a house. Homeowners decide whether or not to put their house up for sale, which entails costs at the rate c. Renters decide whether to search for a house, which is free. If μ_S houses are for sale and μ_B households are searching, houses and potential buyers are matched at the rate $M(\mu_B, \mu_S) = m\mu_B^{\alpha}\mu_S^{1-\alpha}$. Once a house for sale is matched with a (potential) buyer, the seller makes a take-it-or-leave-it offer, and the buyer accepts or rejects the offer.

The supply of houses is fixed at $h < 1$. Renters' and owners' strategies specify probabilities of searching and putting the house up for sale, respectively. Equilibrium strategies are such that (i) each agent's strategy is optimal given other households' strategies (payoffs depend on what others do via the matching process), and (ii) the number of homeowners (happy plus unhappy) is equal to h at all dates. We focus on symmetric equilibria in which the probability of taking an action depends only on the current individual state (happy, unhappy, or renter) and time.

We first consider a steady state in which the population weights μ are constant. We choose parameters such that only unhappy households put their houses up for sale, and all renters search for a house, that is, $\mu_B = \mu_R = 1-h$ and $\mu_S = \mu_U$. In equilibrium, the number of households who begin searching (because they become unhappy with their house) must be equal to the number of households who stop searching because they are matched:

$$\eta \left(h - \mu_U \right) = m \left(1 - h \right)^{\alpha} \mu_U^{1-\alpha}.$$

This condition uniquely determines the equilibrium number of unhappy agents. It is increasing in η, the rate at which households become unhappy. It is also decreasing in m – the faster unhappy sellers are matched with buyers, the fewer households are unhappy in steady state.

We assume that in the steady state selling and buying take the same amount of time on average. The average time for a house to be sold is μ_U/M, and the average time for a searcher to find a house is μ_R/M; we thus require $\mu_U = \mu_R$. We then obtain a simple formula for the equilibrium price:

$$P = \frac{v}{r} - \frac{\eta}{r + \eta + m} \frac{v + c}{r}$$

The first term is the present value of the dividends that would be obtained if the house were always held by a happy owner. The second term is a discount that compensates the buyer for the inconvenience of future search. Indeed, the buyer knows that once he becomes unhappy he will

not be able to sell the house immediately, but will have to forego dividends and incur search costs during the moving process. The discount vanishes as matching becomes infinitely fast ($m \to \infty$).

We choose parameters so that steady state trading and prices are roughly consistent with averages from the American Housing Survey. On average since 1983, about 6 percent of owner-occupied houses are traded per year, and the inventory of houses outstanding is about 3 percent. We thus set $(1-h)/h$, the equilibrium share of houses on the market, equal to 0.03. In addition, we set $1/m$, the average time to sell a house, equal to 0.03/0.06 years, or 6 months. The parameter η is pinned down by the requirement that $\mu_U = \mu_R$. We obtain $\eta = 0.062$, which implies that a household becomes unhappy on average after about 16 years.[2]

We normalize the dividend rate to $v = 1$. The seller's cost c is hard to pin down. It incorporates not only direct transaction cost but also further nonpecuniary costs incurred in the moving process. To put it in perspective, we consider the total cost incurred during an average sale, that is, $c/2$, as a fraction of the value of the house. As a baseline case, we set this fraction to 10 percent. Given a value for the cost fraction, we choose the interest rate r to obtain a steady state price dividend ratio of 16, the average since 1983. In the baseline case, the implied interest rate is $r = 5.48$ percent and the cost is $c = 3.2$.

To study the price impact of a small number of momentum investors, we now consider a one time unanticipated shock that makes all renters – less than 3 percent of the total population – optimistic about future prices. In particular, renters believe that the value of the house is 19 – the price dividend ratio at the top of the boom in 2005 – rather than by the steady state value of 16. However, once renters are matched and purchase a house, they realize that the dividend stream is simply the one for happy owners, and so they turn into happy owners themselves.

[2]Households thus move about half as much as the typical US household. The difference arises because the households in our model are either owners or short-term renters who are actively searching for a new house to own (the average rental period is 6 months). We do not capture movements between rental units or moves between ownership and longer rental periods early or late in life, for example. This also explains why the fraction of renters (3 percent) in the model is much smaller than in the US population (about one third).

Figure 2 shows the behavior of prices and volume in a boom generated by the 3 percent households who become optimistic renters. The dark line in the left hand panel is the average home sale price. The average price increases to 19 on impact and then gradually reverts to the steady state value of 16. The dark line in the right hand panel shows home sales as a percent of all homes, at an annual rate. Sales are initially higher than in the steady state, and also gradually revert. The model thus captures the fact that home sales increase during housing booms. Here we have chosen the parameter $\alpha = 0.57$ in order for sales on impact to rise to the rate observed at the top of the boom in 2005, 9.5 percent.

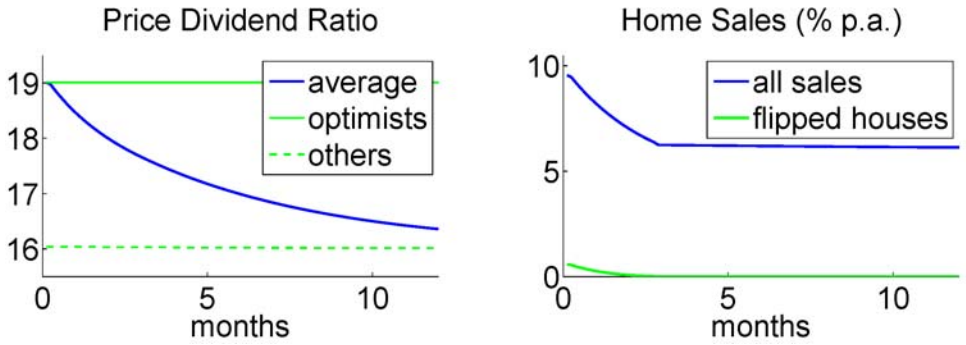

Figure 2: Search model implications for prices and home sales with 3 percent optimistic renters.

Home sales occur both when a seller meets an optimist, and when a seller meets a "sober" household. In the former case, the seller charges the optimist his valuation of 19. The price that a seller charges a sober household is shown as a light dashed line. It is always close to the steady state value of 16, although initially it is slightly higher. The average price mostly reflects the composition of the renter population. Initially, almost all renters are optimists and the price is close to 19. Later, more optimists have bought, and more sober households have become renters, resulting in a lower average price.

During the first three months of the boom, there are sufficiently many optimists in the market that some happy owners also put their home on the market, in the hope of selling to an optimist at an inflated price. (In this phase, happy owners are indifferent between putting the house for

sale or not, and play a mixed strategy.) This is why home sales are much higher in this phase than their steady state rate of 6 percent. Moreover, since all happy owners take the same action, this means in particular that some houses that have just been bought are immediately put back on the market. The light line shows the rate at which houses are "flipped." House flipping also explains why sellers initially charge sober households a price higher than the steady state value of 16: the seller, who has the bargaining power, appropriates the flippers' speculative gain.

The bottom line is that a small fraction of optimistic households can have a large price impact, even if they buy only a small fraction of houses during a modest increase in trading volume. Three features of the model are important for these results. First, the price is set in a bilateral negotiation. The transaction price for a purchase by an optimist thus reflects his valuation. Second, optimists account for a large share of transactions so that they drive the average transaction price. Importantly, optimists can account for a large share of transactions even though they make up only 3 percent of the population. Finally, there are sufficient transaction costs so that happy owners do not flood the market with houses. This keeps trading volume low.

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	cluster 1			cluster 2			cluster 3		
early boom phase, years 2002 and 2003									
cluster probability	0.26			0.64			0.10		
next-year forecasts:	+	same/no m.	–	+	same/no m.	–	+	same/no m.	–
business conditions	0.31	0.47	0.22	0.44	0.42	0.14	0.45	0.38	0.17
interest rates	0.49	0.35	0.16	0.49	0.39	0.12	0.47	0.43	0.10
inflation	0.36	0.36	0.28	0.35	0.32	0.33	0.34	0.33	0.33
credit	0.03	0.85	0.12	1	0	0	0.61	0.39	0
current house prices	0.16	0.61	0.23	0.17	0.81	0.02	0.03	0.97	0
future house prices	0	0.97	0.03	0	1	0	0.99	0	0.01
mean, max s.e.	0.0104, 0.0392			0.0037, 0.0064			0.0106, 0.0153		
late boom phase, years 2004 and 2005									
cluster probability	0.27			0.57			0.16		
next-year forecasts:	+	same/no m.	–	+	same	–	+	same/no m.	–
business conditions	0.19	0.51	0.30	0.35	0.49	0.16	0.34	0.47	0.19
interest rates	0.75	0.19	0.06	0.74	0.22	0.04	0.78	0.19	0.03
inflation	0.36	0.38	0.26	0.33	0.38	0.29	0.32	0.40	0.28
credit	0	0.79	0.21	0.88	0.11	0.01	0.52	0.48	0
current house prices	0.08	0.42	0.50	0.13	0.84	0.03	0.03	0.97	0
future house prices	0.01	0.89	0.10	0	1	0	0.99	0	0.01
mean, max s.e.	0.0120, 0.0234			0.0058, 0.0166			0.0075, 0.012		

Table 1: Cluster analysis for Michigan Survey of Consumers. For next-year forecasts, the answer "+" means higher/better, while "–" means lower/worse. For views about housing, "+" supports the view that now is a good time to buy, while "-" supports the opposite view. Here, "no mention" refers to the case where this argument was not mentioned by the household, "mean s.e." are average standard errors for parameter estimates in the cluster, and "max s.e." are the largest standard errors in the cluster.