The Home Purchase Sentiment Index:

A New Housing Indicator

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Abstract

We built Fannie Mae's Home Purchase Sentiment Index™ (HPSI) with consumers' responses to questions about home buying and selling conditions, income gains and job concerns, and house price and mortgage rate expectations. The HPSI can help forecast mortgage originations and house prices, sales, and starts. Forecasting horse races during 2012-0214 show the HPSI handily outperformed other sentiment indices. We show differences in the HPSI by income and by age groups. We also suggest other aspects of housing where survey-based indicators may help, such as demand by millennials or seniors, home owners' moving, renters' intentions, and mortgage refinancing, delinquency, or default rates.

Keywords: housing, sentiment, forecasting, index

I. Introduction

Housing has long been important in the personal lives and finances of individuals. The Great Recession, and the sluggish recovery of the U.S. economy afterward, reinforced judgments that housing importantly affects the job market, the financial sector, and the rest of the national economy.

An improved understanding of housing can help improve housing and macroeconomic policies and forecasts. In 2010, Fannie Mae started its National Housing Survey™ (NHS) to produce new information about consumers' housing-related attitudes, intentions, and financial conditions. The NHS is the only large-scale, national, monthly survey of consumers focused exclusively on housing. The responses of the nationally representative sample of 1000 consumers each month to about 100 survey questions promptly provide information on a wide range of housing-related topics.

To effectively and efficiently distill information about consumers' housing-related attitudes, intentions, and conditions, we built the Home Purchase Sentiment Index (HPSI) from the responses to six NHS questions. We intend for the HPSI to reflect current housing market conditions and to provide signals about future conditions in housing markets. In that regard, the HPSI is similar in spirit and construction to the University of Michigan's Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index.

Below we note some of the advantages of survey data generally. We briefly discuss some existing consumer and housing indices. We then discuss how we selected component questions from the NHS and show the new Home Purchase Sentiment Index (HPSI). We provide evidence about its 2012-2015 performance in forecasting important housing market outcomes: prices, sales, starts, and mortgage originations. In addition, we show the HPSI by age and by income and note other groups for which HPSIs can be easily calculated. Finally, we suggest some of the other aspects of housing where tailored, survey-based indicators might be built to help analysis and forecasting.[1]

II. Expectations, Surveys, Sentiments, and Housing

Expectations and surveys

Households' expectations have become central to economic analysis, modeling, and policymaking. Long recognized in principle, expectations now figure prominently in practice, permeating discussions and forecasts of consumer spending, business investment, labor costs, inflation, bond yields, and monetary policy. Incorporating expectations is problematic, however,

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[1] Cai, Deggendorf, and Wilcox [2015] provide more details, explanation, and evidence about the National Housing Survey, sentiment indices, and the HPSI.

in large part because most data do not directly measure expectations about the future but, instead, measure "the way we were."

One long established way to get data about expectations is through surveys. Both the demand for and supply of surveys, of business analysts, forecasters, consumers, and businesses, rose noticeably over the past decade. Because studies increasingly concluded that survey data can be informative, and because the costs of conducting and processing surveys decreased, more surveys emerged. That so many private-sector organizations produce and pay for access to survey data for consumer and business attitudes and conditions testifies to the value of such data.

One practical advantage of survey data for analysis and forecasting is that they are often produced quickly, perhaps a few days after the end of a month or even during the month. Second, survey data can be especially valuable in the wake of unexpected or especially large developments. For example, consumers can quickly change their views, as well as their spending and borrowing, in response to a surprising vote in Congress or to an event in the Middle East.

In addition, survey data can be particularly valuable when the news changes consumers' views about longer-run outcomes. Views about longer-run outcomes are particularly important for housing and mortgage markets, where longer-run assets and liabilities predominate. And, by their very nature, longer-run outcomes don't produce much traditional data in the shorter-run.

Consumer sentiment indices

Surveys are used in dozens of countries to build indices of overall consumer sentiment. Two long-running, well-regarded indices of overall consumer sentiment in the United States are the University of Michigan's Survey of Consumer's Index of Consumer Sentiment (ICS) and the Conference Board Consumer Confidence Index (CCI).[2] For similar purposes, businesses are also surveyed in many countries. The Michigan Survey uses phone interviews to get 500 households' views about their personal finances, overall business conditions, and buying conditions. For several decades, the ICS has been calculated from the same five questions. In addition to questions about recent and expected conditions, both personal and national, one of the five questions selected for the ICS asks whether it is a good time to buy big-ticket items.

To produce its monthly CCI, the Conference Board uses the (approximately) 3,500 responses returned to them from the 5,000 questionnaires they send out by U.S. mail. Like the ICS, the CCI is calculated from five questions. The questions selected for the CCI ask consumers about current and expected business and job market conditions, and about their expected future incomes.

Although their questions and calculation methods differ somewhat, in effect, both the ICS and the CCI are based on averages across their five questions of the "net percent positive" responses in their surveys. After the number of negative (or worse or pessimistic) responses is subtracted from the number of positive responses for each question, that difference is expressed as a percent of aggregate responses.

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[2] For simplicity, we refer to both as indices of overall consumer sentiment.

The newer, higher-frequency Bloomberg U.S. Weekly Consumer Comfort Index is based on 1,000 phone interviews to collect consumers' views on the national economy, the buying climate, and their personal financial conditions. In effect, the Consumer Comfort Index is an equally-weighted average of the net percent positives for its three categories of questions. While the ICS equally weights its questions, the weights applied to the questions in the CCI vary over time.

Indices of housing market sentiment or conditions

Some housing-related indices are built from surveys, while others rely on more traditional data. The monthly Housing Market Index (HMI) of the National Association of Home Builders (NAHB) and Wells Fargo is based on mail surveys of NAHB members. The surveys ask builders for their attitudes and expectations for the demand for single-family (SF) homes, and ask them to rate housing market conditions. Essentially, the HMI is a weighted average of the net percent positives for three questions about conditions in and expectations for their local SF markets, with weights apparently determined by each question's historical correlation with future SF housing starts.

The National Association of Realtors (NAR) surveys its members monthly about real estate market conditions and expectations. Rather than forming an index by combining responses to several questions, its REALTORS® Confidence Index (RCI) is a collection of indicators. Each indicator is the average of the members' responses to one of the survey questions, each of which is scored as 0, 50, or 100.

Freddie Mac introduced its Multi-Indicator Market Index (MiMi) in March 2014. According to the Freddie Mac website, "MiMi measures local housing market conditions by combining recent, local-market data with Freddie Mac data…MiMi assesses where each market is relative to its own, long-term, stable range.…" Rather than being based on survey data, MiMi is based on an average of four objective variables.

Consumer sentiment about housing

The monthly NHS started in June 2010. The NHS is the only large-scale, monthly survey of consumers that focuses exclusively on housing. The NHS uses phone interviews of 1000 consumers to get their housing-related attitudes, expectations, and intentions.[3] The NHS is designed to produce a sample of respondents that is nationally representative along eight socio-economic dimensions. To reduce remaining deviations of the sample from national

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[3] The NHS has adjusted as consumers' modes of communications have evolved. Starting in October 2014, the NHS raised the cell-phone share of its phone calls from 25 to 60 percent. Some, but not all, of those respondents also had landline phones. The NHS respondents may then be more representative than those in landline-only surveys.

representativeness, each respondent's answers are weighted before net percent positives are calculated.

The NHS asks consumers for their housing-related views about the recent past, the present, the future, and even about hypothetical situations. The NHS asks consumers about their personal economic and financial conditions, as well as about the economy as a whole. The NHS asks both homeowners and renters about owning and renting homes, home and rental prices, home ownership distress, household finances, and views about the condition and outlook for the economy.

Thus, the NHS provides valuable information about housing markets that is otherwise not available.[4] The resulting, wide-ranging, up-to-date database of consumers' attitudes, conditions, and expectations can provide information quickly and easily, not just to housing analysts and economic forecasters, but to borrowers and lenders, to home sellers and home buyers, and to investors and policymakers.

III. Evidence of Effects of Consumer Sentiment

Over the past two decades, indices of overall consumer sentiment were integral to a number of research studies. Primarily because the ICS and the CCI were the only survey-based national indices with sufficiently long time series to be useful, studies of U.S. data typically relied either on one or the other.

Here we note but a few of the many studies that concluded that consumer sentiment indices added statistically-significantly and often-meaningfully to explanations and forecasts of economically and financially important outcomes. Some studies analyzed whether, and to what extent, adding a measure of consumer sentiment would have improved forecasts of macroeconomic variables, such as GDP, consumer spending, or the probabilities and timing of business cycle peaks and troughs [Carroll, et al. 1994; Bram and Ludvigson 1998; Wilcox 2007; Levanon 2011]. Other outcomes that consumer sentiment indices (along with variables) have been found to help in explaining or forecasting include stock prices, bond yields, corporate credit risk, and revenues of particular industries [Matsusaka and Sbordone 1995; Batchelor and Dua 1998; Longstaff 2002; Lemmon and Portniaguina 2006; Ho and Hung 2009; Barsky and Sims 2012]. While many studies used data only from the U.S., some also included data from other countries, and some did not include U.S. data [Golinelli and Parigi 2004; Dees and Soares Brinca 2013; Nguyen and Claus 2013]. Taken together, these studies indicate that indices of consumer sentiment (or confidence) have long been useful for forecasting or explaining several macroeconomic and other important outcomes.

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[4] Some consumer surveys ask a few housing-related questions.

IV. Building the Home Purchase Sentiment Index

Goals for the HPSI

Our primary goal was to build a single, monthly indicator that would reflect the attitudes, conditions, and expectations that importantly influence consumers' home buying decisions. We also sought an indicator that would supplement insights gleaned from other quantitative and qualitative analyses about (single-family) housing markets.

By simply combining a small number of NHS questions, we sought an index that would provide indications about both current and future conditions in housing markets. Consonant with sentiment indices built from the University of Michigan and Conference Board surveys of consumers, we refer to our indicator as the Home Purchase Sentiment Index (HPSI). As detailed below, the method of calculating the HPSI is simple and is quite similar to the methods used for the ICS and the CCI.

Outcome measures and forecast intervals

As important measures of the strength of single-family housing markets, we chose four outcomes: house prices, home sales, housing starts, and mortgage originations. For the level of house prices, we used the FHFA purchase-only house price index.[5] Home sales data were the sum of new, single-family home sales and of existing, single-family home sales.[6] Originations were the estimated dollar amounts of purchase-money-mortgage originations.[7] Housing starts were for single-family (1-4) units.[8] Each of these series was seasonally adjusted.

When we discuss and present future outcomes, we are referring to their averages during entire, upcoming, 12-month intervals. (We occasionally refer to shorter, 6-month future intervals.) For example, as of June 2012, future home sales were the total of home sales during the 12 months from July 2012 through June 2013. As of June 2012, future house price growth was calculated as the change, in percent, of a house price index averaged over July 2011-June 2012 to its average over July 2012-June 2013.

Preliminary candidate questions for the HPSI

We started with a long list of candidate questions to include in the HPSI. We chose 28 questions as preliminary candidates on the basis of data availability, of priori judgments, of coverage of important aspects of housing markets, and because of their simple correlations with the four housing market outcome measures during 2010-2014. We tilted toward including, but did not require, questions that were in the initial (June 2010) NHS. Then, before further

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[5] Source: U.S. Federal Housing Finance Agency (FHFA).
[6] Source: U.S. Bureau of the Census and National Association of Realtors (NAR).
[7] Source: Mortgage Bankers Association (MBA). Quarterly data were assigned to mid-quarter months. Amounts for other months were derived by linearly interpolating between mid-quarter months. We seasonally adjusted the monthly estimates by applying the seasonal factors for home sales.
[8] Source: U.S. Bureau of the Census.

analyzing them statistically, we judged which NHS questions were likely to have empirically meaningful and plausibly reliable connections to housing market outcomes.

The 28 preliminary candidates covered a wide range of topics that might provide signals about housing markets. Some questions asked about personal, and some asked about national economic and financial conditions, and expectations. One asked whether it is a good time to buy a home; another asked whether it is a good time to sell. Questions asked about the difficulty of getting a mortgage or about making mortgage payments. Some asked the reasons for, and intentions about, buying homes or renting. Questions asked about recent income changes and about expected future house prices and mortgage rates.

Paring the list of candidate questions

Although the ICS and the CCI are both calculated from five questions, and in practice many consumer and housing market indices are built from five questions, there is no analytical or practical imperative that dictates using exactly five. Nonetheless, in light of common practice and the relatively short history of the NHS, we were inclined to select about five questions for the HPSI.

To begin paring down our initial, long list to a "short list" of about 10 candidate questions, we used (backward) stepwise regressions of each of the four important housing market outcomes on its own lagged dependent variable plus the long list of candidates. We then iterated informally, using judgment and stepwise regression results, to select variables for inclusion and for exclusion. We generally removed questions that we deemed to have stepwise regression coefficients of the "wrong" sign. We iterated until our procedure settled on questions that were statistically significant at the five percent level or better.[9]

V. Current Responses to Survey Questions and Future Housing Outcomes

Table 1 lists the topics of the nine questions that remained at the end of our iterative procedure. (Also included in Table 1 is question Q12, which asks whether it is a good or bad time to buy a house. Q12 is discussed more below.)

<<Table 1 here>>

Table 2 displays the results of our iterative regression procedure. With data available through the end of 2014, the estimation period for 12-month-ahead outcomes ended in December 2013. Each column in Table 2 is a forecasting equation in that it resulted from regressing outcomes during the upcoming 12 (or 6) months on the current month value of the NHS questions. For both the 12-month-ahead and the 6-month-ahead horizons, each of the four

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[9] Throughout, we refer to having at least 95 percent confidence, or equivalently having a significance level of 0.05 or better (i.e., five percent or lower), that a coefficient or relation differs from zero as being "statistically significant," taking into account the effects of any other variables that were included in a regression.

housing market outcomes was statistically significantly affected by at least four of the remaining nine candidate questions. Table 2 also shows that Q18 and Q20B, which asked about future rents and mortgage rates, significantly improved forecasts for all eight of the outcomes.

<<Table 2 here>>

Q22 and Q109 asked about perceived problems, ex ante and ex post, with mortgage credit; Q22 asked whether mortgages are difficult to get. Given the enormous amount of discussion about tight mortgage credit over 2010-2014, we expected that Q22 might be particularly informative about future housing outcomes. It was not.

Table 1 also contains Q12 and Q112B. Q12, which asked consumers whether it was a good (or bad) time to buy a house, never significantly affected any of the eight outcomes in Table 2. Because Q112B, which asked consumers how concerned they were about losing their jobs during the next 12 months, did not enter the survey until March 2011, we did not include it in our iterative procedure.

House price growth

House price growth proved to be only weakly connected over these years to *whether* consumers expected home prices to rise (Q15), and to *how much* they expected home prices to change (Q16&Q17).[10] Only for the six-month horizon and then only with small effect (0.01) were future home prices correlated with consumers' expected percentages of house price change (Q16&Q17). In contrast to the weak connections of future to expected house price growth, house prices were forecasted to grow significantly faster when more consumers' expected mortgage rates to decline (Q20B).

Forecasts of house price growth were also significantly higher when more consumers reported that mortgages were easy to get (Q22), fewer were stressed about debt payments (Q109), more reported recent income gains (Q116), and more expected rents to rise (Q18). Neither consumers' responses about whether it was a good (or bad) time to buy a house (Q12, which is not shown) nor whether it was a good (or bad) time to sell a house (Q13) was significantly connected to future house price growth, once the effects of the other included variables were taken into account.

Home sales

Columns 3 and 4 show that future home sales were significantly connected to responses about a good time to sell and whether house prices, rents, and mortgage rates were expected to rise, as well as to stress about debt payment.

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[10] Questions Q16 and Q17 separately asked by what percent consumers expected house prices to go up and go down over the next 12 months.

Housing starts

When more consumers responded that it was a good time to sell homes, then housing starts tended to be stronger over the following year. Expectations of higher rents and lower mortgage interest rates, as well as more responses that mortgages were easy to get, also tended to foreshadow more housing starts in the future.

Mortgage originations

More (dollars of new, purchase-money) originations in the future were also forecasted by more responses that it was a good time to buy a house, that house prices and rents would rise, and that mortgage rates would fall over the next 12 months. Future originations were also higher when fewer consumers reported that they were stressed by their debt payments.

VI. Building the Home Purchase Sentiment Index

Criteria for HPSI questions

From the ten questions in Table 1, on the basis of judgment and statistical evidence, we ultimately selected the six questions in Table 3 for the HPSI. We sought to include questions that would reflect the factors presumed to drive home purchases: incomes, interest rates, and house prices – whether experienced or expected. We also wanted the HPSI to reflect households' uncertainties about those factors because home ownership entails large, long-term financial and social commitments. We sought questions that were likely to reflect perennial, rather than ephemeral, considerations. We sought questions that seemed more likely to bear steady, rather than fluctuating relations to housing outcomes. We sought questions that had some track record in forecasting, regardless of whether they caused future housing market outcomes. In choosing the six component questions, we used statistical evidence like that in Table 2. We also used statistical evidence for a longer time period that was based on Michigan survey data.[11] And, ultimately, we used judgment to fill in for the absence of statistical evidence and sometimes to overrule statistical evidence.

<<Table 3 here>>

The six component questions differ in how well they satisfy our criteria. In addition to their logical appeal, questions Q13, Q15, Q20B, and Q116 had considerable statistical support in Table 2. We thought that responses to Q12, whether it is a good (or bad) time to buy a house, were likely to give quantitatively important and reliable signals about future housing market outcomes. While the a priori case for including Q12 seemed strong, the statistical evidence from the 2010-2013 period was weak. On the other hand, the statistical evidence based on Michigan survey data for a longer period strongly favored including Q12, regarding a good time to buy

[Wilcox 2015]. Over longer or less exceptional periods, Q12 might well be more informative. Indicators of employment conditions often appear in other consumer indices. Two CCI questions focus on the job market. Nonetheless, because we judged that job-loss concerns would be quantitatively important and fairly reliable signals for understanding and forecasting housing market outcomes, we chose to include Q112B in the HPSI.

HPSI's six component questions: 2011-2014

Figure 1 shows the HPSI (thick black line) and the net percent positive responses to its six component questions for March 2011-December 2014. The six questions that we used to calculate the HPSI are: "good time to buy a house" (Q12 (black, solid line)), "good time to sell a house" (Q13 (gray, solid line)), "expectations of higher home prices" (Q15 (black, dashed line)), "expectations of lower mortgage rates" (Q20B (gray, dashed line)), "household income increased" (Q116 (black, dotted line)), and "not concerned about job loss" (Q112B (gray, dotted line)). Because the NHS began asking consumers about their job loss concerns (Q112B) in March 2011, the data in Figure 1 also begin then. Table 2 shows that housing markets tended to strengthen after *declines* in the net percent positive responses to two of the HPSI component questions: "expectations of higher mortgage rates" and "job loss concerns." So that plots of their data in Figure 1 rose when these two questions signaled stronger housing market conditions, Figure 1 plots the *negative* of the net positive responses. Figure 1 also reminds us the net percent positive responses can be either positive or negative.

<<Figure 1 here>>

In contrast to the responses about whether it was a good or bad time to sell a house, the net percent positive of those who responded that it was a good time to buy a house, Q12, was strongly positive throughout this period. As we had expected, Q12 rose and fell as the housing market and the outlook for housing rose in 2011-2012 and fell in 2013. But, in light of the housing turmoil then, its volatility was surprisingly low.

The path of Q13, whether it was a good time to sell a house, was strikingly different than that of Q12, whether it was a good time to buy a house. First, the net percent positive was always *negative*: There were always fewer respondents who said it was a good time to sell than said that it was a bad time to sell a house. Second, "good time to sell a house" rose sharply (from nearly -80) through Spring 2013 and then plateaued for about a year before it generally trended upward through the end of 2014.

The net percent positive responses to whether home prices will rise over the upcoming 12 months, Q15, hovered around 10 percent during 2011, rose steadily through the middle in the middle of 2013, and remained at nearly 40 percent at the end of 2014.

The net percent positive responses to whether mortgage rates would fall, Q20B (gray, dashed line), ranged from minus 20 to minus 40 percent. Thus, on balance, consumers responded that they expected mortgage interest rates to rise. The decline in rates after the middle of 2012

coincided with more responses that rates would decline in the future; the rise in rates that started in the Spring of 2013 (the "taper tantrum") coincided with more consumers expecting that mortgage rates would rise after that. It is striking how often and how large the net percent of respondents was that expected higher mortgage rates. But, for forecasting purposes, the time path of Q20B still seems likely to be informative. And, as Table 2 shows, expectations about mortgage rates very reliably forecasted housing markets. Indeed, Q20B was the only HPSI component that significantly improved forecasts for all eight housing market outcomes in Table 2.

The net percent of respondents whose incomes increased over the past year, Q116, was always positive and tended to rise slowly over this entire period. If the economy were booming, labor markets were tight, and inflation closer to its historical averages, we might expect to see high and volatile values for Q116. We did not. The slowly declining concerns about job loss comport with the low and slowly rising net percent of respondents with higher incomes.

Calculating the Home Purchase Sentiment Index

Given its six component questions, how did we calculate the Home Purchase Sentiment Index (HPSI)? Simply: The HPSI is the average of the net percent positive responses of each of its six component questions.[12] The only other step in calculating the HPSI, which we included for technical and presentation reasons, is to add 63.5 to the average of the net percent positive responses. (Adding 63.5 makes the initial (March 2011) value of the HPSI equal 60.)

The HPSI is an "equal weighted" index in that we take a simple, rather than a weighted, average, of the net percent positives. Using equal, as opposed to data based or otherwise chosen weights has a number of advantages. First, equal weights make the HPSI fast, easy, and accurate to calculate each month. As soon as the NHS data are available, HPSI can be calculated without analysis, decisions, or adjustments. Second, equal weights are much easier to explain and comprehend. Third, it is common, though not universal, for consumer indices to have equal weights; for example, the ICS is based on equal weights.

A case can be made that unequal and time varying weights would be preferable. Many quantity and price indices have weights that change frequently. If weights were based on data, perhaps in the form of regression results, then incoming data would seem to argue for time varying weights. One drawback of time varying weights is they suggest revising past weights and, thus, index values. We also eschewed seasonal adjustments to the HPSI and to its component questions.

Nonetheless, the components contribute very unequally to the equally weighted HPSI. Relative contributions can be measured by relative volatility. In Figure 1, the HPSI mostly moved due to its more volatile components during 2011-2014: good time to sell, home prices will go up, mortgage rates will go up.

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[12] As noted earlier, for the two questions whose positive responses were negatively correlated with housing market outcomes, we use their net percent *negative* responses.

HPSI history: 2011-2014

The Home Purchase Sentiment Index declined from its beginning in March 2011 through the summer of 2011, when there was great uncertainty about the resolution and effects of the federal debt ceiling difficulties. From then until about the middle of 2013, the HPSI rose quite a lot and quite steadily. As Figure 1 shows, each of the HPSI components contributed to its rise, except for the question about whether mortgage interest rates were expected to go down. In the spring of 2013, the HPSI spiked up, primarily due to the uptick in "good time to sell." The HPSI then declined considerably through the second half of 2013. The surge in mortgage rates in the middle of 2013 apparently triggered downdrafts, not only in "mortgage rates will go down," but also, noticeably and not surprisingly, in "good time to buy" and in "home prices will go up." During 2014, the HPSI went up and down and back up, with a downtick in the fall of 2014.

VII. Wider Uses for Narrower HPSIs

HPSI indices can be calculated easily for specific groups or conditions. To illustrate, Figures 2 and 3 plot the HPSI for selected income and age groups. Figure 2 shows that the HPSI rose considerably more for the highest-income group (who had household incomes of more than $100,000) than it did for the middle or lowest income group in Figure 2. Figure 3 shows that, compared with the overall HPSI, during 2011-2014 the HPSI rose less for the youngest (18-34 years) group and perhaps more than the overall HPSI among the group aged 35-44 years.

<<Figure 2 here>>

<<Figure 3 here>>

One benefit of the simple HPSI calculation method is that it can be applied so easily to obtain targeted indices, such as HPSIs for married people living in the Northeast, for younger people with higher incomes, or for younger renters with recent increases in incomes. Of course, finer divisions of the total national monthly sample size of 1000 respondents leave fewer consumers per group. Nonetheless, the information about a target group may often outweigh the additional sampling errors.

The more disparate the attitudes, intentions, and conditions of a larger group, the more likely that HPSIs for narrower target groups will be valuable. Regional and demographic factors are likely to contribute more to housing markets in most future periods than they did over the past decade of national housing market boom, bust, triage, and recuperation. If they do, then differences in HPSI movements across regions and groups are also likely to be larger than we have observed so far. Then, HPSIs by region and by group may be especially informative and valuable.

VIII. HPSI Performance: Forecasting Housing Outcomes

The HPSI may provide valuable signals about future housing market outcomes, either when used alone or when used to supplement other information, or both. The figures and tables that follow show that, to varying degrees, movements of the HPSI during 2011-2013 did signal future house price growth, home sales, housing starts, and mortgage originations. Evaluation of its forecasting performance during this period, of course, should take into account that memories of this period are still relatively fresh and that we pared down the number of candidate questions and then finalized the six HPSI questions partly on the basis of Table 2's forecasting performances of individual NHS questions.

House price growth

Figure 4 plots the level of the HPSI (solid black line) and the growth rates of house prices over the next 12- (dashed black line) and 6-month (solid gray line) intervals for March 2011-June 2014. It is apparent that movements of the HPSI did not forecast well the rise or the fall of house price growth during 2012-2015. While the HPSI steadily marched up, the growth rate of house prices over future 12-month intervals rose from 2 to 8 percent and then settled in the neighborhood of 5 percent. The correlations of the HPSI with the future growth rates of house prices over 6-month and 12-month horizons were 0.17 and 0.33. Column 1 of Table 4 shows that, during 2011-2013, future house price growth for 12-month horizons was not significantly related to the current HPSI.

<<Figure 4 here>>

Other forecasts of house price growth fared little, if any, better than the HPSI. Responses to NHS and Michigan survey questions that were asked directly show that households' expectations fell short of actual future house price growth rates by amounts that were virtually always positive, were often large, and were variable. Professional forecasts also tended to under-estimate high and rising house price growth rates in 2012 and 2013.

Home sales

Figure 5 substitutes home sales for the house price growth rates that appeared in Figure 4. The milder slowdown in home sales than in house price growth rates meant that the upward trending HPSI (solid black line) was correlated more with home sales than with house price growth rates. The results in column 2 of Table 4 support that that perspective, since the HPSI coefficient was significant at more than 99 percent and the regression's R^2 jumped to over 70 percent. As Figure 5 shows, the HPSI was even more correlated with home sales six months ahead (solid gray line). Naturally enough, the NHS respondents had not foreseen, at either 12-month or six-month horizons, the "taper tantrum" or the abrupt increases in mortgage rates in the spring of 2013, with their ensuing tolls on home sales. Nor is it likely that consumers foresaw the

declines in mortgage rates during 2014, declines apparently triggered in large part by international political events and by news from global oil markets.

<<Figure 5 here>>

Housing starts and mortgage originations

Column 3 of Table 4 shows that the HPSI was even more highly correlated with future single-family housing starts than with sales or prices. Column 4 then shows that future (purchase-money) mortgage originations were highly correlated with current values of the HPSI.[13]

<<Table 4 here>>

Thus, the current HPSI was significantly related to home sales, single-family starts, and mortgage originations. Notable, however, was the much weaker relation over this period of the HPSI to future house price growth rates.

IX. Forecasting Horse Races

HPSI vs. MHPSI

Here we compare the forecasting ability of the HPSI to the abilities of two indices that are based on the University of Michigan's Survey of Consumers: the Index of Consumer Sentiment (ICS) and a housing-oriented index (MHPSI). We calculated the MHPSI as the average of the net percent positive responses to five questions in the Michigan survey that are similar to those we used to build the HPSI. Not surprisingly, the MHPSI was highly correlated (0.93) over March 2011-December 2014. Both series trended upward then, sagged noticeably in the middle of 2013 following the bond market's taper tantrum, and then in early 2014 generally resumed their upward marches.

A natural question is whether the HPSI adds information to that in the data for the long running ICS or data for the MHPSI. A statistical "horse race" is a time-honored way to help answer such a question. Table 5 has race results. Columns 1, 3, and 5 show regressions for the estimation period of March 2011-December 2013 of future housing market outcomes on the HPSI and the MHPSI simultaneously.

<<Table 5 here>>

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[13] We seasonally adjusted the MBA's originations data with a seasonal adjustment routine in STATA. We had to use a different method to seasonally adjust the short span of Fannie Mae data.

In its head-to-head race against MHPSI, the HPSI clearly won. Rows 1 and 2 in Table 5 show that the three future housing outcomes (home sales, single-family starts, and mortgage originations) were each significantly related to the HPSI, but not to the MHPSI.[14] Thus, these race results imply that including HPSI improved forecasts of housing market outcomes, while the MHPSI did not. The source of HPSI's stronger performance is not completely clear. One possibility is that it stems from differences in questions: The NHS asks specifically about mortgage rates, while the Michigan survey asks about borrowing rates in general. If, for example, the Fed's QE programs lowered mortgage interest rates and lowered their correlation with consumers' borrowing rates generally during this period, that ought to raise the HPSI's forecasting performance relative to that of the MHPSI.

Housing Sentiment vs. Consumer Sentiment

Another question is whether the HPSI improves forecasts once we take into account overall consumer sentiment. Given its focus on housing, we would surely expect the HPSI to perform well in housing forecast horse races against the ICS. Table 5 shows that it does: For each of the three housing outcomes, the HPSI was strongly significant, while the ICS did not detectably improve housing forecasts. The higher R-squared statistics in columns 1, 3, and 5 than in columns 2, 4, and 6 show that, of the two Michigan-based indices, the MHPSI added more to housing forecasts than the ICS did. In that regard, the results in columns 2, 4, and 6 in Table 5 reinforce the usefulness of a housing-focused sentiment index for forecasting housing markets.

Since 2000, national factors may have had unusually large effects on housing. At the same time, national factors apparently caused the housing sector to diverge more than usual from the national economy. Times when housing does diverge more are the times when housing-focused information, such as that in the HPSI, is likely to be more valuable. And, in turn, indices of overall consumer sentiment like the ICS seem likely to forecast overall consumer spending better at those times than either the MHPSI or the HPSI would. Thus, housing-focused and overall consumer sentiment are both likely to be especially valuable at the same time.

Conclusions and Extensions

We used data from Fannie Mae's National Housing Survey to build the Home Purchase Sentiment Index (HPSI). Using six survey questions, we built the HPSI to indicate consumers' sentiments toward housing and to provide signals about current and, especially, about future housing market conditions. Since the HPSI started in March 2011, its increases were quite reliably followed by stronger housing markets. In forecasting horse races, the HPSI outperformed the Index of Consumer Sentiment and a housing-oriented index that we built with data from the Michigan survey.

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[14] Neither index, alone or simultaneously, was significantly related to future house prices.

The simplicity of the HPSI makes it easy to calculate HPSIs for groups of particular interest. As examples, we showed HPSIs by income and by age. HPSIs can be calculated easily for many other target groups.

In addition, NHS data can be used to build indices to signal developments other than home purchase sentiment. Examples might include specialized indices that aim to measure millennials' or seniors' housing attitudes and conditions, to help forecast renters' attitudes, to predict home owners' moving, or to understand or forecast mortgage refinancing, delinquency, and default.

References

Barsky, Robert B., and Eric R. Sims. 2012. "Information, Animal Spirits, and the Meaning of Innovations in Consumer Confidence." *American Economic Review*, 102(4) June: 1343-77.

Batchelor, Roy, and Pami Dua. 1998. "Improving Macro-Economic Forecasts: The Role of Consumer Confidence." International Journal of Forecasting. 14(1): 71-81.

Bram, Jason and Sydney Ludvigson. 1998. "Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race." FRBNY Economic Policy Review. 4(2) June: 59-78.

Cai, Qiang, Steve Deggendorf, and James A. Wilcox. 2015. "Building a Home Purchase Sentiment Index." working paper. September.
http://www.fanniemae.com/resources/file/research/housingsurvey/pdf/hpsi-whitepaper.pdf

Carroll, Christopher D., Jeffrey Fuhrer, and David W. Wilcox. 1994. "Does Consumer Sentiment Forecast Household Spending? If So, Why?" American Economic Review. 84(5) December: 1397-1408.

Dees, Stephane, and Pedro Soares Brinca. 2013. "Consumer confidence as a predictor of consumption spending: Evidence for the United States and the Euro area." International Economics. 134 December: 1-14. http://dx.doi.org/10.1016/j.inteco.2013.05.001.

Golinelli, Roberto and Giuseppe Parigi. 2004. "Consumer Sentiment and Economic Activity: A Cross Country Comparison." Journal of Business Cycle Measurement and Analysis. 1(2): 147-170.

Ho, Chienwei and Chi-Hsiou Hung. 2009. "Investor Sentiment as Conditioning Information in Asset Pricing." Journal of Banking & Finance. 33(5) May: 892-903.

Lemmon, Michael and Evgenia Portniaguina. 2006. "Consumer Confidence and Asset Prices: Some Empirical Evidence." Review of Financial Studies. 19(4): 1499-1529.

Levanon, Gad. 2011. "Forecasting Recession and Slow-Down Probabilities with Markov Switching Probabilities as Right-Hand-Side Variables." Business Economics. 46(2) April: 99-110.

Longstaff, Francis A. 2002. "The Flight-to-Liquidity Premium in U.S. Treasury Bond Prices." National Bureau of Economic Research Working Paper 9312. October.

Matsusaka, John G., and Argia M. Sbordone. 1995. "Consumer Confidence and Economic Fluctuations." Economic Inquiry. 33(2) April: 296-318.

Nguyen, Viet Hoang, and Edda Claus. 2013. "Good news, bad news, consumer sentiment and consumption behavior." Journal of Economic Psychology. 39(C) December: 426-438. http://dx.doi.org/10.1016/j.joep.2013.10.001.

Wilcox, James A. 2007. "Forecasting Components of Consumption with Components of Consumer Sentiment." Business Economics. 42(4) October: 22-32.

_____. 2015. "Forecasting Housing with Household Sentiment." In process. July.

Table 1

National Housing Survey Question Numbers and Topics

	Question	Topic
1.	Q12	Good time to buy a house
2.	Q13	Good time to sell a house
3.	Q15 or Q16&Q17	Expectations of higher home prices
4.	Q18	Expectations of higher rents
5.	Q20B	Expectations of higher mortgage rates
6.	Q22	Difficult to get a mortgage
7.	Q109	Stressed about debt payments
8.	Q112B	Concerns about job loss
9.	Q116	Household income increased
10.	Q117	Household expenses increased

Table 2

Regressions of Future Housing Outcomes on Current Individual NHS Questions

	Independent Variables	Dependent Variables: Housing Outcomes During the Next 12 (or Six) Months							
		House Price Growth		Home Sales		Single-Family Starts		Mortgage Originations	
		12 months	6 months	12 months	6 months	12 months	6 months	12 months	6 months
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Q13			573**	548***	242***	199***	147***	139**
2.	Q15			656**	1,256***		137***	266***	301***
3.	Q16&Q17		0.01***						
4.	Q18	0.45***	0.49***	3,116***	2,891***	612***	446***	317***	269**
5.	Q20B	-0.25***	-0.33***	-2,166***	-2,161***	-368***	-350***	-410***	-237***
6.	Q22		-0.14**			-208**	-168**		
7.	Q109	-0.095**		-787**				-220***	
8.	Q116	0.17**							
9.	Q117		0.16**						
	Observations	43	49	43	49	43	49	43	49
	R-squared	0.907	0.864	0.930	0.918	0.937	0.936	0.927	0.852

Notes: Asterisks denote statistical significance at the 10 (*), 5 (**), and 1 (***) percent levels. The table shows the results of the iterative procedure described in the text. The estimation period was June 2010 – December 2013 (June 2014) for the 12-month (six-month) forecast horizon, or interval, except for house price growth, which we had the 12-months-ahead data through November 2013 and six-months-ahead data through May 2014. Housing market outcomes were seasonally adjusted. Data for net percent positive responses to NHS questions were not seasonally adjusted.

Table 3

The Six Component Questions of the Home Purchase Sentiment Index (HPSI)

	Question	Question Topic	Time Period
1.	Q12	Good time to buy a house	Current period
2.	Q13	Good time to sell a house	Current period
3.	Q15	Expectations of higher home prices	Next 12 months
4.	Q20B	Expectations of higher mortgage rates	Next 12 months
5.	Q112B	Concerns about job loss	Next 12 months
6.	Q116	Household income increased	Past 12 months

Table 4

Regressions of Future Housing Outcomes on the Current HPSI

	Independent Variables	House Price Growth	Home Sales	Single-Family Starts	Mortgage Originations
		(1)	(2)	(3)	(4)
1.	HPSI	0.0608	0.0350***	0.0082***	10.58***
		(1.39)	(8.90)	(11.15)	(12.21)
2.	Constant	1.53	2.78***	0.008	-96.79
		(0.51)	(10.16)	(0.16)	(-1.61)
	Observations	34	34	34	34
	R-squared	0.057	0.712	0.795	0.823

Notes: t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels. Future outcomes are calculated over upcoming 12-month intervals, The monthly estimation period was March 2011 – December 2013.
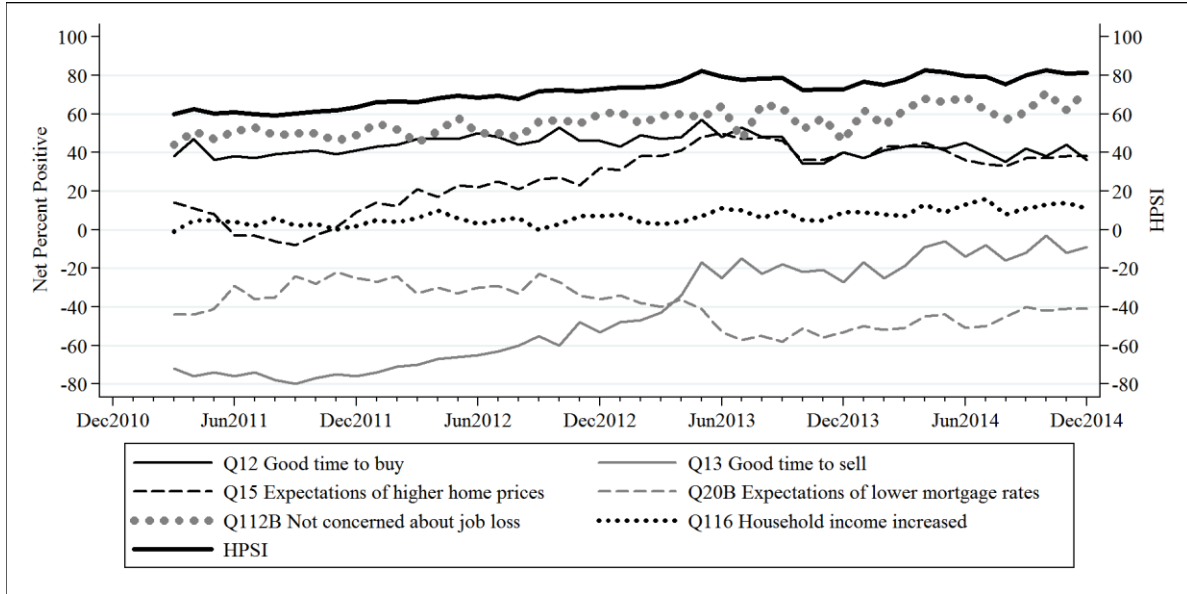
Table 5

Forecasting Horse Races: HPSI vs. MHPSI and vs. ICS

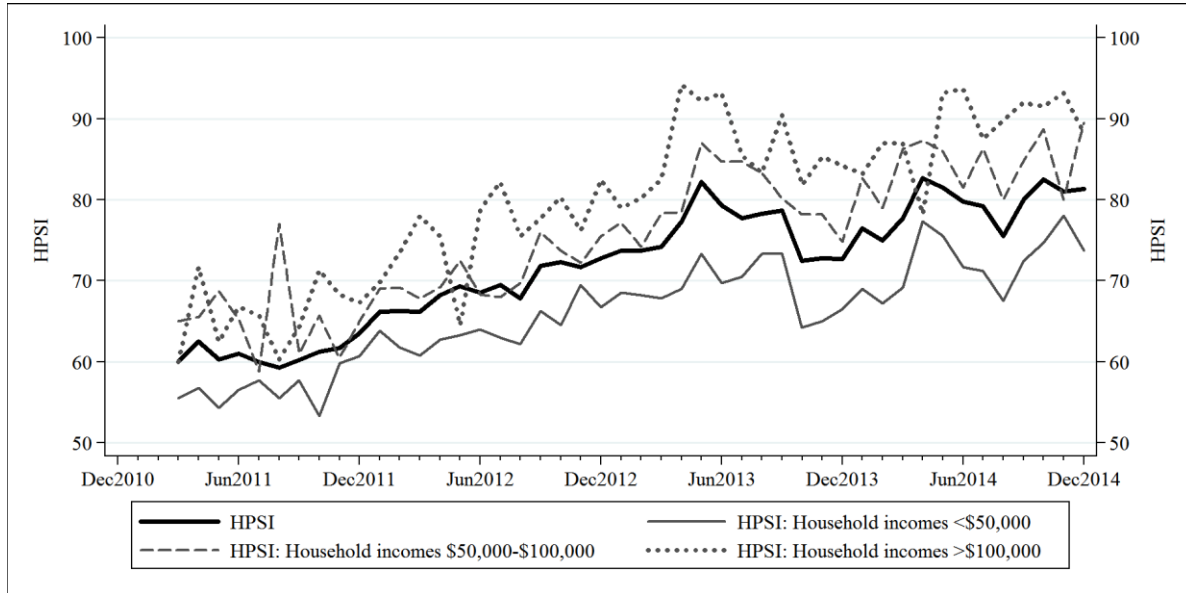|	Independent Variables	Home Sales	Home Sales	Single-Family Starts	Single-Family Starts	Mortgage Originations	Mortgage Originations
		(1)	(2)	(3)	(4)	(5)	(6)
1.	HPSI	0.0245**	0.0344***	0.0064***	0.0086***	8.69***	10.61***
		(2.50)	(5.033)	(3.43)	(6.79)	(4.00)	(7.03)
2.	MHPSI	0.0098	---	0.0018	---	1.75	---
		(1.18)	---	(1.16)	---	(0.95)	---
3.	ICS	---	0.0007	---	-0.0005	---	-0.02
		---	(0.11)	---	(-0.44)	---	(-0.02)
4.	Constant	2.91***	2.77***	0.032	0.0147	-73.55	-96.95
		(9.89)	(9.62)	(0.58)	(0.26)	(-1.13)	(-1.53)
	Observations	34	34	34	34	34	34
	R-squared	0.725	0.713	0.804	09.797	0.828	0.823

Notes: t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels. Future outcomes are calculated over upcoming 12-month intervals. The estimation period was March 2011-December 2013.

Figure 1

HPSI and Its Six Component Questions

(Monthly, not seasonally adjusted, March 2011 – December 2014)

Figure 2

HPSI by Household Income Group

(Monthly, not seasonally adjusted, March 2011–December 2014)

Figure 3

HPSI by Age Group

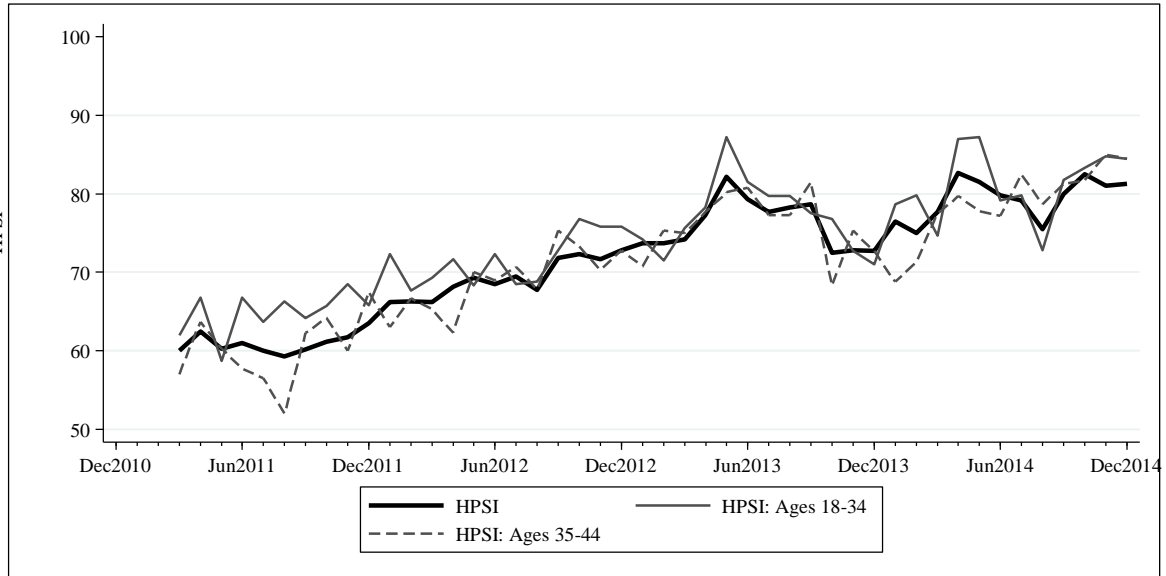**(Monthly, not seasonally adjusted, March 2011–December 2014)**

Figure 4

HPSI and Future House Price Growth over 12- and Six-Month Horizons

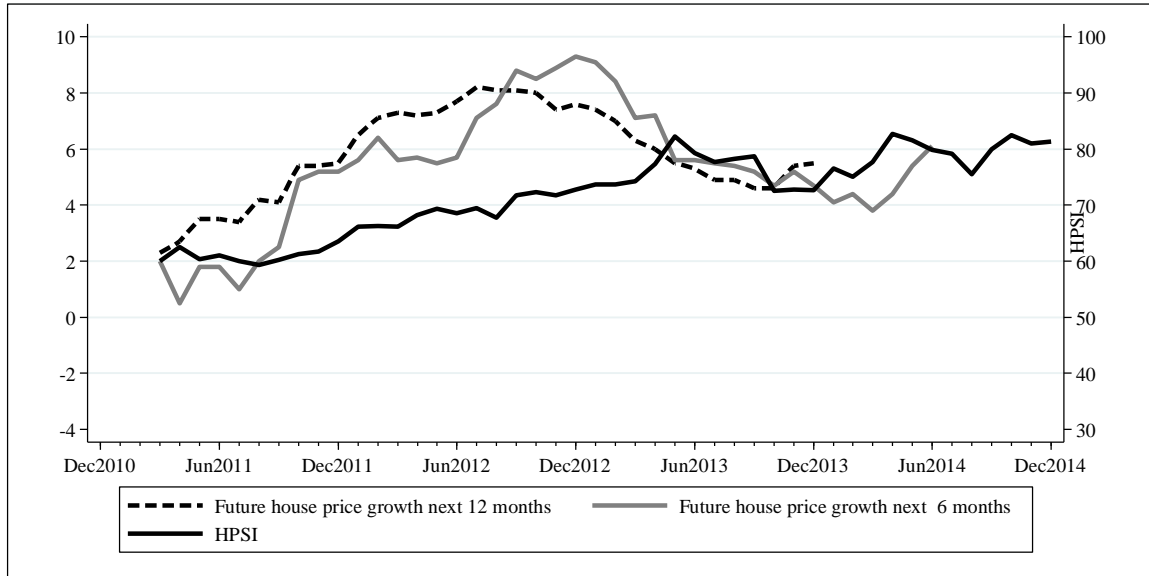**(Monthly, house price growth: percent SAAR, March 2011–June 2014)**

Figure 5

HPSI and Future Home Sales over 12- and Six-Month Horizons

(Monthly, home sales: seasonally adjusted, annual rate, millions, March 2011–June 2014)