BUILDING A HOME PURCHASE SENTIMENT INDEX™

QIANG CAI

FANNIE MAE

STEVE DEGGENDORF

FANNIE MAE

AND

JAMES A. WILCOX

UNIVERSITY OF CALIFORNIA, BERKELEY

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EXECUTIVE SUMMARY

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Fannie Mae launched the National Housing Survey™ (NHS) in 2010 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 that is focused exclusively on housing. Compared with traditional, objective data, survey responses can often better and sooner indicate how consumers interpret and then likely act upon recent events and changed economic relationships. The traumatic events of the recent financial crisis and Great Recession, and the resulting changes in the organization and regulation of mortgage and other financial markets, likely make the NHS particularly valuable.

Our Home Purchase Sentiment Index (HPSI) aims to improve understanding of current conditions in housing and mortgage markets and to provide signals about future outcomes. Although it focuses on housing, the HPSI is similar in spirit to long-established indices of general consumer sentiment and confidence. To distill effectively and efficiently information about consumers' housing-related attitudes, intentions, and conditions, we combined the answers to six NHS questions into a single indicator of consumers' overall sentiment toward purchasing homes. We chose the six questions on the basis of their answers' forecasting performances over 2010-2014 and of our judgments.

Since it began, increases in the HPSI have been quite reliably followed by stronger housing markets. In addition, the correlations of recent changes in the HPSI with forecast errors made on average by housing-forecast organizations suggest that incorporating signals from the HPSI could improve year-ahead forecasts. Additional evidence bolstered our confidence in the reliability of the HPSI. With data for 1992-2013 from the University of Michigan's Survey of Consumers, we built an analog to the HPSI. We found that increases in the analogous questions and index were also followed by stronger housing markets.

Home purchase sentiment indices can be readily calculated for consumers grouped by demographics, location, or situations. As examples, we show the HPSI by age, by income, and by region. A different set of NHS questions could be chosen to build an indicator of default risk or of refinancing probabilities.

I. Introduction

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

Improving awareness and understanding of housing-related topics promotes healthier housing. To produce new information about consumers' housing-related attitudes, intentions, and financial conditions, Fannie Mae launched the National Housing Survey (NHS) in 2010. The NHS is the only large-scale, national, monthly survey of consumers that is focused exclusively on housing. The survey poses dozens of questions each month. These core questions cover a wide range of housing-related topics. In addition, to address particular, topical issues that arise, the survey rotates supplemental questions into and out of the survey.

The resulting, free, accessible, systematic, up-to-date information about consumers' attitudes and situations can help a wide range of groups with their housing-related decisions. These data can provide information that is valuable to renters as well as homeowners, to borrowers as well as to lenders, to home sellers as well as to homebuyers, to investors as well as to public policymakers, and to analysts inside as well as outside Fannie Mae.

The responses to the dozens of survey questions provide a wealth of information about consumers. To distill effectively and efficiently some of the information about their attitudes, intentions, and conditions, we combined the responses to a small number of questions into an index. The resulting housing sentiment index can readily convey a summary of consumers' views that pertain to housing. The index is intended to reflect current housing market conditions and to provide signals about future conditions in housing markets.

Below we describe what information some staff at Fannie Mae told us that they would like to glean from the NHS. We then discuss some of the advantages and disadvantages of survey data generally and data from the NHS in particular. We also discuss the benefits of indices and how they might track housing sentiment. Then, we describe how the major consumer sentiment indices and some other indices are constructed.

To distill effectively and efficiently information about consumers' housing-related attitudes, intentions, and conditions, we combined six questions in the NHS to form a prototype measure of sentiment that is similar in spirit to the University of Michigan's Index of Consumer Sentiment. Our Home Purchase Sentiment Index (HPSI) is intended to reflect current housing market conditions and to provide signals about future conditions in housing markets.

Its performance indicates that the HPSI provides useful and new information. Since the HPSI started in March 2011, increases in the HPSI have been quite reliably followed by stronger housing markets. That suggests that the HPSI may be useful as a stand-alone indicator for housing markets. In addition, we found that recent changes in the HPSI were correlated to varying degrees with forecast errors made

on average by housing-forecast organizations. Those results suggest that forecasts for house prices particularly and for home sales and purchase-money-mortgage originations less consistently could have been more accurate during this period if they had been adjusted somewhat in the direction of recent changes in the HPSI. Confidence that the HPSI sends reliable signals about housing markets was bolstered by our finding, for the much-longer 1992 – 2013 period, that increases in an analogous index that we built from data from the University of Michigan Surveys of Consumers were also reliably followed by stronger housing markets.

II. Goals and Uses for the NHS and Sentiment Indices

A. Stakeholders Inside and Outside Fannie Mae

After analyzing the data from the NHS, we explored whether we could use the NHS data to build indices that effectively indicate consumers' sentiment about housing and signal current and future housing market conditions.

As we proceeded, we sought out and met with staff from a wide range of departments and responsibilities at Fannie Mae. To explain how we might proceed and to solicit their needs, wants, and views, we met with staff who are involved with underwriting, pricing, capital markets, economics, business strategy, customer engagement, Desktop Underwriter, and so on. Just as the specific responsibilities and goals of departments and staff ranged widely, so too did their perceptions and suggestions about how the NHS and housing sentiment indices might help meet their responsibilities in particular and how they might benefit Fannie Mae more broadly. We also made presentations to the Federal Reserve and to FHFA.

Our discussions reinforced some of our initial suppositions about the value of measures both of wider and of narrower ranges of housing-related topics. Staff from a wide range of departments generally voiced support for distilling consumers' wide-ranging and sometimes volatile views of the "health" of the housing market into a single measure. Some staff opined that a single measure would help them directly. Others opined that others would benefit directly. Yet others showed interest, perhaps in addition to a broader measure, in measures that focused more narrowly on their purviews. Along those lines, we noted that we were analyzing whether we could produce both a housing sentiment index (HSI) that pertained to housing broadly and separate indices that might be tailored to certain aspects of housing, such as mortgage refinancing, delinquency, and so on.

Having indices of consumers' housing sentiment might promote public awareness and understanding of housing and improve housing policies. Such indices may enable information and messages about housing to be more simply and more effectively conveyed.

B. Benefits of Survey Data

Surveys can produce valuable information that is otherwise not available. Surveys can produce data for consumers' views about the present, about the future, and even about hypothetical situations. Surveys

can produce data for consumers' views about their experiences, their own economic conditions, and their outlooks for themselves, but also for the economy as a whole.

The public and private sectors produce, collect, report, and analyze data for many aspects of housing markets. For example, the public sector collects and reports data for the inventory and sales of new, single-family (SF) homes; the private sector collects data for the inventory and sales of existing single-family homes. The public sector collects data for the amounts of residential mortgage debt outstanding; the private sector collects data on mortgage applications.

Typically, the data objectively, though imperfectly, measure specified aspects of housing markets. To improve the accuracy of reported data, for some variables, judgmental adjustments are made to the collected data. Because adjusting the data requires judgments, both private-sector and public-sector organizations often do not adjust the data they have collected. For example, typically, non-survey data typically are not adjusted for the numbers of days, holidays, or weekends in a month, for atypical weather, for natural disasters, or for other widely recognized, but perhaps quantitatively uncertain, influences.

Importantly, nearly all of these data measure what has happened--often recently, such as over the past year or quarter, but still in the past. Thus, objective data usually reflect the way we were.

Surveys produce data that can have several important advantages over standard, objective measures: Their data often are available sooner, reflect how consumers evaluate very recent news, reflect how much consumers evaluate any changes to established economic relationships, and can isolate the effects of specific factors of supply and of demand.

Consumers can rapidly change their views about economically significant, current and upcoming developments. Their views and assessments can change much more rapidly than can actual economic outcomes. For example, consumers might quickly change their spending or borrowing in response to an announcement by the President, a surprising vote in Congress, an event in the Middle East, and so on.

Consumers can similarly change their views about how the economy and their own circumstances will respond to any given development. Changes in consumers' "mental models" of the economy may be glacial, or they may be more rapid, but still gradual. For example, the continual accumulation of news, data, and experience can persuade consumers that the U.S. inflation rate no longer responds during the 2000s by nearly as much as it did before the 1990s to a $10 rise or fall in the world price of crude oil.

Since the 1990s, the roles of expectations in formal models of national economies have increased greatly. Incorporating forward-looking behavior is now common in these models' explanations and forecasts of consumer spending, business investment, labor costs, inflation, interest rates (especially long-term), monetary policy, and other parts of economic models.

Expectations about the amounts and variability of incomes may crucially affect their spending currently and in the near future. Objective measures of economic magnitudes in the past, regardless of how recent the past, can often approximate those expectations. However, objective data may be usefully complemented by direct answers to survey questions about expectations.

C. Benefits of Indices

Organizations typically report responses to many or all of the questions in their surveys. Totals or percentages of responses, and not individuals' responses, are reported. Depending on the question, the responses may provide information about broad or about very narrow topics. The responses to single questions, whether broad or narrow, can be valuable.

Sometimes, organizations combine the responses from more than one question. One example is the University of Michigan's Index of Consumer Sentiment, which we discuss in detail below. On the other hand, although the Federal Reserve Board reports the responses to each of the questions in its quarterly survey of bank loan officers, it does not combine the answers into an "index."

Following convention, we will refer to the result of combining the responses to each of two or more questions as an "index." The terminology here can be confusing. Note that "combining" responses to multiple questions is conceptually distinct from "re-basing" responses or combinations of responses to equal a number, usually 100, at a given time. Without re-basing (or indexing), responses from several questions can be combined, e.g., by simply adding together the percent of respondents who gave positive answers to each question. Regardless, we refer to the values of combinations of responses to different questions as an "index."

Often, but not necessarily, the resulting combination of responses for each period is "indexed", or re-based, to equal 100 during a chosen base period, such as a recent calendar year. For example, the Consumer Price Index (CPI) is a budget-weighted average of the prices of the hundreds of goods and services that consumers buy.

The CPI is currently indexed, or re-based, so that its value during 1982-1984 equals 100. (Eventually, the government will switch to a base period that is more recent than 1982-1984. When it does, the value of the CPI will be re-set to 100 for the new base period and the values of the CPI for all of the other years will be scaled accordingly.) For example, the June 2013 (all-city, not seasonally adjusted) CPI value of 229.5 indicated that consumer prices were 129.5 percent higher in June 2013 than in the 1982-1984 base period.) Similarly, the time series data for a single variable, for example real GDP or housing starts, could be indexed to equal 100 in 2015 by dividing the entire time series for that variable by its value over calendar year 2015. Thus, time series data can be combined or indexed (i.e., re-based), or both, or neither.

There are many survey-data-based indices of consumer, general business, and industry-specific conditions and attitudes. Many are very well regarded and highly visible, within their spheres and even

in the public. That so many private-sector organizations devote resources to conducting surveys and reporting their data testifies to the information and value that they provide.

An index often has at least two valuable features. One is that an index, like a portfolio, reflects its components. Sometimes we have direct measures of the variable that we care about. For example, we may care about and have government-provided data on housing starts. Very often, however, we have multiple measures, say responses to many survey questions that are plausibly correlated with a variable that we care about. The measures each might measure or reflect different parts of the variable that we care about. Like a well-constructed portfolio, each of these measures can be an asset that adds to the performance of the combination of measures. Thus, an index should perform better than any one or even any subset, of its components.

A second valuable feature is that an index, in addition to generally performing better than its components, can distill information about quite different aspects of a variable that we care about, say the overall health of housing, into a single, easily conveyed number. In addition, plotting only a line for the index can effectively display how the health of housing has varied over recent periods.

Combining multiple measures into an index requires two, unavoidable, important decisions: which measures to combine and how much weight to give each measure in the index. Judgment, even if it is the judgment to follow a statistical or some other rule, is required. Below we describe the decisions made by the best-known consumer sentiment and confidence indices. After that, we describe how we combined responses to two sets of five NHS questions to construct two candidate Housing Sentiment Indices.

D. Benefits of the NHS

Important elements of the design, methods, and topics of the National Housing Survey have been detailed in previous memos. Most of them are not recounted here. We will highlight a few of the salient features of the NHS.

The NHS is large. Each month, the survey gathers responses from an adult in 1,000 separate households. That is twice as many households as the Michigan survey gathers. The larger sample size reduces the NHS's margin of error considerably and thereby boosts our confidence in its signals relative to a survey with smaller samples.

The NHS is also large in that each month it repeats about 100 questions that relate to housing. In addition, when a topic of particular interest arises, the NHS can temporarily include about a dozen supplemental questions on that topic. Having more than 100 questions devoted to housing-related topics allows the NHS to cover a wide range of housing-related topics, some in great detail. The NHS is also large in that it will have collected five years of monthly data by June 2015. It has the" first-mover advantage" that no other survey or data will ever be able to obtain such data for those years. That advantage grows larger every month that others don't conduct surveys similar to the NHS.

Another potential advantage of the NHS is its data for "intensity." For relatively more of its questions than for other surveys, the NHS offers consumers the chance to answer with intensity. That is, rather than allowing consumers a choice of only three answers (positive, neutral, or negative), the NHS more often gives consumers the freedom to express the intensity of their views by allowing them a choice of five answers (very positive, positive, neutral, negative, very negative). Other surveys less frequently offer consumers the freedom to express intensity. Even when other surveys' answers to some of their questions do allow that freedom, typically reports like press releases and more systematic studies do not incorporate the intensity of consumers' responses. (Often the data for each of the allowed responses are publicly available.) Consumers' ensuing decisions and actions, say to buy a home or refinance a mortgage, may be signaled especially by intense responses. Below we discuss the potential role for the intensity of responses, but also report our finding that allowing for intensity produced a sentiment index that differed very little from the index that ignored intensity of responses.

The NHS has adjusted as consumers' modes of communications have evolved. As the share of cell-phone-only (CPO) households in the U.S. has risen, the National Housing Survey raised the share of its interviews that are conducted via consumers' cell phones.[1] The 2013 National Health Interview Survey, which was conducted by the U.S. Centers for Disease Control and Prevention, concluded that the share of CPO households in the U.S. was 41 percent. In past National Housing Survey interviews, almost two-thirds of interviews that were conducted via cell phones were CPO households.

So that the NHS closely mirrored the nation's 41 percent CPO share of households, starting with the October 2014 survey, the NHS raised the cell-phone share of its phone calls to 60 percent. (The cell-phone share of NHS phone calls prior to October 2014 was 25 percent.) For the first few months after September 2014, the effects of contacting more respondents via cell phones on summary measures like the National Housing Survey's Key Indicators were minimal. How much and when the CPO share of households will rise is uncertain, as are any differences between CPO and other households. Regardless, the NHS has been attuned to and is positioned to detect such effects. To the extent that the effects become more salient, the NHS sample of respondents, and thus the data, likely be more representative and informative than data from landline-only surveys.

[1] CPO households do not have any landline phones.

III. Other Sentiment Indices

There are many survey-based indices that are related to sentiment. Some indices are highly visible and closely followed, with noticeable financial market reactions to unexpected movements of the indices. Some indices are based on surveys of U.S. consumers; dozens of other countries also conduct surveys and produce consumer sentiment indices. Some are based on surveys of business, either in the U.S., in other countries, or in groups of countries, such as the European Union. Some surveys and indices are aimed at housing markets.

We describe in this section the two principal U.S. consumer sentiment indices and how they are constructed. We then describe other housing-related and consumer sentiment indices. To reiterate, though there are surveys of consumers that have some housing-related questions and though there are housing-related surveys (of home builders), the NHS is the only large, regular survey that has a large battery of questions that elicit consumers' views about housing.

The two best-known indices of consumer sentiment in the United States are the University of Michigan Index of Consumer Sentiment ("ICS") and the Conference Board Consumer Confidence Index ("CCI"). Somewhat less well known are several business-oriented (as opposed to consumer-oriented) surveys that are used to construct sentiment indices.[2] In this section, we provide an overview of these sentiment indices, summarizing the survey and construction methods specific to each. Next, we highlight a number of studies from the academic literature of economics, finance, and statistics that explicitly make reference either to the ICS or the CCI. As will be discussed below, these studies provide an illustration of the varied uses to which the major indices of consumer sentiment have been put in an attempt to forecast or otherwise explain market or macroeconomic outcomes.

A. Index of Consumer Sentiment ("ICS")

1. Survey Method

The University of Michigan's Index of Consumer Sentiment is calculated from responses to its "Surveys of Consumers." Each month the Michigan survey interviews by phone approximately 500 households living in the lower-48, contiguous United States and the District of Columbia.[3] The survey contains approximately 50 core questions each month about consumers' conditions, perceptions, and

[2] In addition, the Federal Reserve has long surveyed a few dozen of the largest banks through its Senior Loan Officer Opinion Survey. The Fed reports answers to its questions, but it does not combine the survey responses into a composite index.

[3] University of Michigan, "Survey of Consumers," available at http://www.sca.isr.umich.edu/fetchdoc.php? docid=24774; University of Michigan, "Surveys of Consumers: Sample Design," *available at* http://www.sca.isr.umich.edu/fetchdoc.php?docid=24773; University of Michigan, "Surveys of Consumers: Index Calculations," *available at* http://www.sca.isr.umich.edu/fetchdoc.php?docid=24770; University of Michigan, "Surveys of Consumers – Questionnaire," *available at* http://www.sca.isr.umich.edu/fetchdoc.php? docid=24776.

expectations. The core questions generally solicit responses about topics in three broad categories: (1) personal finances; (2) business conditions; and (3) buying conditions.

For each monthly survey, an independent cross-section sample of households is drawn, and these respondents are re-interviewed six months later (a practice described as “rotating panel sample design” in the methodological notes to the preparation of the ICS). Thus, for any particular monthly survey, the total sample typically is composed of 60 percent new respondents and 40 percent respondents who are being interviewed for the second time. According to the University of Michigan, this practice allows for the regular identification of changes in attitudes and behavior, at both individual and aggregate levels, and it is intended to lead to better assessments of the causes for such changes. Individual sample responses within any particular monthly survey are weighted such that two objectives are met: first, that the weights will yield a representative sample of all U.S. households; and, second, that the weights will yield a representative sample of all adults living in private households.

2. Construction of the Michigan Index of Consumer Sentiment

While the Survey of Consumers currently asks about 50 core questions, responses to the same five questions for decades have been used to construct the University of Michigan Index of Consumer Sentiment. The five questions used to construct the Michigan Index of Consumer Sentiment are shown below in Table III-1.

Table III-1

Survey Questions that the Michigan Survey Research Center Uses to Calculate Its Index of Consumer Sentiment

Number	Question	Response Categories
A2	*"We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?"*	1. Better Now 3. Same 5. Worse 8. Don't Know
A3	*"Now looking ahead--do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?"*	1. Will Be Better Off 3. Same 5. Will Be Worse Off 8. Don't Know
A4	*"Now turning to business conditions in the country as a whole--do you think that during the next twelve months we'll have good times financially, or bad times, or what?"*	1. Good Times 2. Good With Qualifications 3. Pro-Con 4. Bad With Qualifications 5. Bad Times 8. Don't Know
A8	*"Looking ahead, which would you say is more likely--that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?"*	If R Answers In Comparative Terms, i.e., "Better," "Worse," or "Same," Probe: "Would That Be Good Times or Bad Times?
A18	*"About the big things people buy for their homes--such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?"*	1. Good 3. Pro-Con 5. Bad 8. Don't Know
Source: University of Michigan Surveys of Consumers		

Relative scores are constructed for each of the five index questions. To begin with, the percentage of respondents giving an unfavorable reply (i.e., indicating a pessimistic, "bad" or "worse" response) to the question is subtracted from the percentage of respondents giving a favorable reply (i.e., indicating an optimistic, "good" or "better" response) to the question.[4] This difference is multiplied by 100 and then added to 100 to yield the relative score for the question in the month. Net negative responses will

[4] A positive percentage is calculated as the number of positive responses divided by the total number of responses. Similarly, a negative percentage is calculated as the number of negative responses divided by the total number of responses.

thus have a relative score less than 100, while net positive responses will have a relative score greater than 100.[5] The relative score for each question is rounded to the nearest integer, and the rounded relative scores for the five index questions are summed. The summed total is then indexed by dividing it by 6.7558 (so that the index equals 100 in the chosen base year of 1966). Then, a constant value of 2.0 is then added to produce the final value of the Index of Consumer Sentiment for the month.[6] For example, if the rounded relative scores for each of the five index questions were determined to be 110, 87, 93, 135, and 120, then the ICS value for the month would be equal to 82.7.[7]

B. Consumer Confidence Index ("CCI")

1. Survey Method

The Consumer Confidence Index (CCI) is constructed each month by the Conference Board. The Conference Board is a not-for-profit "business membership and research association," founded in 1916, that seeks to be "an objective, independent source of business and economic knowledge" for its more than 1,200 member organizations worldwide.[8] In addition to the CCI, the Conference Board reports other data that is collected via its Consumer Confidence Survey. Since 1967, the Consumer Confidence Survey has collected data that indicate consumer confidence, consumer plans to purchase goods or take vacations, and other aspects of consumer behavior.[9] Initially, the Conference Board conducted its survey bi-monthly. Since June, 1977, the Consumer Confidence Survey has collected data monthly. Each month, the survey mails questionnaires to about 5,000 U.S. households. About 3,500 responses are completed and returned to the Conference Board each month. As we describe below, the Conference Board uses the responses to a few of the survey questions to construct the CCI.

In February 2011, several modifications were made to the Consumer Confidence Survey. In particular, the survey instituted the use of a probability-design random sample, made some changes to the manner in which it weights survey responses, and adopted the "X-12-ARIMA" seasonal adjustment program of the U.S. Census Bureau.[10] The Conference Board provided us with explanatory notes regarding the modifications to the CCI survey methods. According to the notes, the 2011 modifications were

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[5] For example, if Question A2 is 35% positive and 37% negative, then the relative score is (35% - 37% = -2% × 100 = -2 +100) = 98. By contrast, if Question A2 is 37% positive and 35% negative, then the relative score is (37% - 35% = 2% × 100 = 2 +100) = 102.

[6] The constant, which is currently 2.0, has changed over time and ostensibly corrects for sample design changes since the 1950s.

[7] That is, (110 + 87 + 93 + 135 + 120) / 6.7558 + 2.0 = 82.7.

[8] The Conference Board, "About Us," http://www.conference-board.org/about/index.cfm?id=1980 (visited July 31, 2013).

[9] The Conference Board, "Consumer Confidence Survey® Technical Note – February 2011," (Feb. 2011) *available at* http://www.conference-board.org/pdf_free/press/TechnicalPDF_4134_1298367128.pdf; The Conference Board, "Research Series for Historical Data on Buying Plans and Vacation Intentions," *available at* http://www.conference-board.org/data/requestformCCI.cfm.

[10] The Conference Board apparently also changed survey providers in February of 2011, switching from TNS to The Nielsen Company.

designed to ensure that the sample-based estimates of household population categories match specified independent Census population controls. The modifications were also designed to remove fluctuations in the series that stemmed from periodic events, such as seasonal weather, holidays, and the beginnings and ends of school years.

2. Construction of the Conference Board Consumer Confidence Index

The Consumer Confidence Survey has a much larger sample size each month than the Michigan Survey of Consumers: Often about 3,500 responses compared with Michigan's 500. The questions in the Consumer Confidence Survey cover a wide range of topics. As with Michigan's Index of Consumer Sentiment, the Conference Board's Consumer Confidence Index (CCI) uses five questions to construct its measure of consumer sentiment. Those five questions ask respondents for their: (1) appraisals of current business conditions; (2) appraisals of current employment conditions; (3) expectations regarding business conditions six months hence; (4) expectations regarding employment conditions six months hence; and (5) expectations regarding each respondent's total family income six months hence.

The five questions from its Consumer Confidence Survey that the Conference Board uses to calculate the Consumer Confidence Index (CCI) are shown in Table III-2.

Table III-2

Survey Questions that the Conference Board Uses to Calculate Its Consumer Confidence Index

Number	Question	Response Categories
1	*"How would you rate the present general business conditions in your area?"*	1. Good 2. Normal 3. Bad
1a	*"SIX MONTHS from now, do you think they will be:"*	1. Better? 2. Same? 3. Worse?
2	*"What would you say about available jobs in your area right now?"*	1. Plenty 2. Not so many 3. Hard to get
2a	*"SIX MONTHS from now, do you think there will be:"*	1. More? 2. Same? 3. Fewer?
3	*"How would you guess your total family income to be SIX MONTHS from now?"*	1. Higher 2. Same 3. Lower
Source: Conference Board U.S. Consumer Confidence Survey		

Currently, the survey questions used in the Consumer Confidence Survey are not available publicly. Nor are precise details about how the Consumer Confidence Index is calculated. The following walkthrough of CCI calculation is based on an illustrative example provided to us by Allen Li, a Research Analyst at the Conference Board. Mr. Li cautioned that the seasonal adjustment factors and the 1985 index values used below are just illustrative and should be regarded as placeholders and not actual, historical data.

For each of the five questions used to construct the CCI, respondents have three choices, which can be termed positive (optimistic), neutral, or negative (pessimistic). For each question in each month, percentage positive, neutral, and negative responses are calculated. Each of the three percentage response rates (positive, neutral, and negative) is then divided by its own seasonal factor to remove seasonality.[11]

[11] The specific positive, negative, and neutral seasonality adjustment factors are apparently determined by the Conference Board using U.S. Census Bureau software and are not typically disclosed.

Then, the seasonally-adjusted response rate for each question is divided by the sum of the (seasonally-adjusted, percentage) positive and negative response rates to yield a "relative value." Often, but surely not always, the relative values track the shares of positive responses in all responses. Questions with a net positive response share have a relative value greater than 0.50; questions with a net negative response share have a relative value less than 0.50.[12]

To re-base, or index, the CCI so that it equals 100 in the chosen base year for the CCI of 1985, for each of the five questions, its relative values are divided by the average value of that question's relative value during 1985. The overall Consumer Confidence Index value for each month is then calculated as the average of the five, resulting re-based, or indexed, data series.

Table III-3 presents further detail on the methods employed in the NHS, Michigan (ICS), and Conference Board (CCI) consumer surveys. Table III-4 compares the wording of questions on specific topics (e.g., personal finance, business conditions, big ticket purchases, job markets) across the three surveys.

[12] In Mr. Li's example, if the seasonally adjusted response rates for Question One in the month were 37.1 percent positive, 36.4 percent negative, and 24.2 neutral, then the Question One relative value would be calculated as 37.1/(37.1+36.4) = 0.5048.

Table III-3

Consumer Survey Methods: NHS, Michigan, and Conference Board

Survey Method	NHS	Michigan	Conference Board
Mode	Telephone. About 60 percent cell phone calls to obtain Center for Disease Control and Prevention estimates for cellphone-only households.	Telephone	Mail
Sampling	Targeted random digit dial	Rotating panel with 60% first-timers and 40% re-interviewed from past 6 months	Probability-designed random sample
Weighting	Weighted to match US adult population using most recent 1-year American Community Survey population profile	For probability of selection and to Census (age and income)	For probability of selection and to Census (region, age, gender, and income)
Sample size	1,000 monthly	250-300 for mid-month release 500 for end-of-month revision	About 2,500 for end-of-month release; 3,500 for later revision
Field period	Around first of the month through about three weeks into the month	Around first of the month through a few days before the release	Sent first of the month; Accepts returns through end of month
Fieldwork	Penn Schoen Berland	Michigan Survey Research Center	The Nielsen Company
Release	On or around the 7th of each month following the month of data collection	Preliminary figures at mid- month; final figures at end of the month	Prelim. figures, last Tuesday of month; final figures with next month's release
History	Monthly Since July, 2010[13]	Started bimonthly in 1967; went to monthly in 1977	Started annually in 1946; quarterly in 1952 and monthly in 1978
Source: National Housing Survey, University of Michigan Surveys of Consumers, Conference Board U. S. Consumer Confidence Survey			

[13] On January and June of 2010, two surveys has been done each with 3000 samples. The regular 1000 sample per month NHS didn't start until July, 2010.

Table III-4

Consumer Survey Questions: NHS, Michigan, and Conference Board

Question Category	NHS	Michigan	Conference Board
Personal Finance	*Q11B: Now looking back over the past year, has your personal financial situation gotten much better, somewhat better, stayed about the same, gotten somewhat worse, or gotten much worse?*	*A2: We are interested in how people are getting along financially these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?*	
	Q11: Looking ahead one year, do you expect your personal financial situation to get much better, somewhat better, stay about the same, get somewhat worse, or get much worse?	*A3: Now looking ahead--do you think that a year from now you (and your family living there) will be better off financially, or worse off, or just about the same as now?*	*"How would you guess your total family income to be six months from now?"*
Business Conditions	*Q10: In general, do you think our economy is on the right track or is it off on the wrong track?*	*A4: Now turning to business conditions in the country as a whole--do you think that during the next twelve months we'll have good times financially, or bad times, or what?*	*"How would you rate present general business conditions in your area?"*
		A8: Looking ahead, which would you say is more likely--that in the country as a whole we'll have continuous good times during the next five years or so, or that we will have periods of widespread unemployment or depression, or what?	*"Six months from now, do you think business conditions in your area will be [better/same/worse]?"*
"Big-Ticket" Purchases	*Q70E: Do you plan on buying any big household items, such as furniture, major appliances, or a TV in the next twelve months?*[14]	*A18: About the big things people buy for their homes--such as furniture, a refrigerator, stove, television, and things like that. Generally speaking, do you think now is a good or bad time for people to buy major household items?*	
Job Market	*Q112B: How concerned are you that you will lose your job in the next twelve months? Are you very concerned, somewhat concerned, not very concerned, or not at all concerned that you will lose your job in the next twelve months?*		*"What would you say about available jobs in your area right now?"*
			"Six months from now, do you think there will be [more/same/fewer] jobs available in your area?"
Source: National Housing Survey, University of Michigan Surveys of Consumers, Conference Board U.S. Consumer Confidence Survey			

[14] The question is discontinued since October 2014

C. Housing-Related Sentiment Indices

The first two of these indices are based on surveys of business. Both are aimed at specific segments, rather than the entire, housing market. The third index is not based on survey data, and the fourth is based on surveys of consumers. Table III-5 provides detail about the methods used to calculate the four housing-related indices.

1. National Association of Home Builders Housing Market Index ("HMI")

The Housing Market Index of the National Association of Home Builders ("NAHB") and Wells Fargo is based on a survey that has been mailed to a panel of NAHB builder members every month since January of 1985.[15] The survey, which is intended to assess builders' attitudes and expectations regarding demand for single-family housing in the United States, asks the NAHB panel members to rate housing market conditions based upon their individual experiences. Specifically, the survey asks respondents, on a monthly basis, "to rate market conditions for the sale of new homes at the present time and in the next 6 months as well as the traffic of prospective buyers of new homes."[16] Notably, the direct focus of the HMI is thus on the demand for new, not existing, houses. Approximately 400 responses to the survey are obtained each month.

Generally speaking, the HMI is a weighted average of responses to survey questions asking builders to rate three aspects of their local market conditions: (1) current sales of single-family detached new homes; (2) expected sales of single-family detached new homes over the next 6 months; and (3) traffic of prospective buyers in new homes. Sales expectations are expressed as "good," "fair," or "poor," and the traffic of prospective buyers is characterized as "high to very high," "average," or "low to very low." To construct the index, the positive and negative response percentages calculated for each question in the month are seasonally adjusted. Next, a net relative response percentage (i.e., strong minus weak) is determined for each question using the seasonally adjusted rates and then expressed as an index value. Finally, a weighted average of the three questions' seasonally adjusted series is calculated, using question-specific weights that are apparently based on observed correlations with present and future single-family housing starts. This weighted average, expressed on a scale from 0 to 100, is the HMI for the month.

[15] See Anupam Nanda, Ph.D., "Examining the NAHB/Wells Fargo Housing Market Index (HMI)," (Mar. 29, 2007) *available at* http://m.nahb.org/fileUpload_details.aspx?contentTypeID=3&contentID=73820&subContentID=99275. For further information regarding the predictive power analysis for the HMI, *see* Anupam Nanda, Ph.D., "Examining the NAHB/Wells Fargo Housing Market Index (HMI) – Technical Appendix," (Mar. 29, 2007) *available at* http://www.nahb.org/fileUpload_details.aspx?contentTypeID=3&contentID=73820&subContentID =99182.

[16] National Association of Home Builders, "What is the NAHB-Wells Fargo Housing Market Index (HMI)?," http://www.nahb.org/generic.aspx?sectionID=134&genericContentID=532 (visited Aug. 2, 2013).

2. National Association of Realtors

The National Association of Realtors ("NAR") surveys its members monthly about topics that are of relevance to them – e.g., real estate market conditions and expectations, buyer/seller traffic, price trends, buyer profiles, and other issues that specifically affect real estate. NAR uses the survey responses to construct the NAR's REALTORS® Confidence Index ("RCI"). In fact, NAR does not produce an index that combines responses from multiple questions that are in its survey. Rather, NAR produces several indices, each of which is based on the responses to a particular question. Each month, the average of the respondents' (scored) responses for a particular question is reported as the value for the confidence "index" associated with that question's topic. Each respondent's answer, e.g., "weak," "moderate," or "strong," is scored as 0, 50, or 100. Thus, for each month for each particular question the average scored response, which is also the value of that index, will fall within the range of 0-100.

3. Freddie Mac

Freddie Mac has published a monthly housing market index, Multi-Indicator Market Index (MiMi), since March, 2014. According to its website, "MiMi measures local housing market conditions by combining recent, local-market data with Freddie Mac data for all 50 states plus the District of Columbia, the top 100 metro areas, and the nation.[17] Specifically, MiMi assesses where each market is relative to its own, long-term, stable range by looking at home purchase (mortgage) applications, payment-to-income ratios (changes in home purchasing power based on house prices, mortgage rates and household income), proportion of current mortgage payments in each market, and the local employment picture. The four indicators are combined to create a composite MiMi value for each market. The indicators themselves act as weights on a scale that measure shifts in a particular market. When the indicators are in balance – what MiMi refers to as "In Range" - the market is considered stable and within its long-term, normal range. When the indicators move outside of their long-term stable range, the market is considered either weak or elevated." Note that MiMi is not based on survey data but, rather, is based on public economic data and on Freddie Mac's proprietary data.

4. Pulsenomics/Zillow

Pulsenomics/Zillow introduced its Housing Confidence Index (HCI) in April, 2014. The HCI is based on telephone and online surveys every six months in 20 MSAs. The HCI is based on responses to 13 questions. The HCI is calculated as a weighted average of three sub-indices: Four questions are used to calculate a Housing Market Conditions Index (25%), five questions used to calculate a Housing Expectations Index (50%), and four questions used to calculate a Homeownership Aspirations Index (25%). An HCI is calculated for each of the 20 MSAs. The national HCI is calculated by aggregating the 20 MSA indices. Table III-6 lists the questions in the Pulsenomics/Zillow survey.

[17] http://www.freddiemac.com/mimi/about.html

Table III-5

Sources and Survey Methods of Housing market Indices

	NAHB/Wells Fargo	NAR	Freddie Mac	Pulsenomics/Zillow
Survey Methods	**Housing Market Index**	**REALTORS® Confidence Index**	**Multi-Indicator Market Index**	**Housing Confidence Index**
Mode	Mail	Telephone	N/A	Automated telephone and online
Sampling	Panel	About 50,000 randomly-selected NAR members	N/A	Random digit dialing
Weighting	No	No	N/A	Weighted to match corresponding MSA populations
Sample size	400 monthly	About 3,000 monthly	N/A	10,000 every 6 months
Field period	Early each month	Early each month	N/A	First and third quarters each year
Fieldwork	NAHB	NAR	Freddie Mac	Pulsenomics
Release	Middle of next month	Middle of next month	End of each month, with two month lag	Second and fourth quarters
Initiated	January 1985	January 2008	March, 2014	April, 2014

Source: NAHB, NAR, Freddie Mac, Pulsenomics

Table III-6

Pulsenomics/Zillow Survey Questions

Sub-Index	Question	Weight (%)
Housing Market Conditions (25% weight in HCI)	Local home values relative to inflation (change over past 12 months)	25
	Current direction of local housing market	25
	Local market buying conditions assessment	25
	Local market selling conditions assessment	25
Housing Expectations (50% weight in HCI)	Near-term: Expected direction and pace of local home value change over the coming 12-month period, relative to expected inflation	10
	Long-term: Expected direction and pace of local home value changes over the coming 10-year period, relative to expected inflation	40
	Confidence about future affordability of current home	20
	Financial value of homeownership vs. renting	15
	Investment value of homeownership vs. other investment options	15
Homeownership Aspirations (25% weight in HCI)	Provides more (or less) freedom than renting	20
	Is necessary to live The Good Life and The American Dream	20
	Is necessary to achieve social status and earn respect	20
	Homeowners planning to buy again in the future	40
Source: Pulsenomics		

D. Other Sentiment Indices

1. Bloomberg U.S. Weekly Consumer Comfort Index

Reported continuously since late 1985, the Bloomberg U.S. Weekly Consumer Comfort Index is based on survey research conducted by Langer Research Associates of New York (with field work by SSRS/Social Science Research Solutions of Media, Pennsylvania). The index is based on a four-week rolling of average of 1,000 responses that are solicited by random-sample telephone interviews. The survey interviews approximately 250 adults per week to get information about consumers' assessments about the national economy, the buying climate, and their personal financial conditions.

To construct the index, the percentages of households with negative views on the economy, on personal finances, and on buying climate are subtracted from the percentages with positive views. Then, in effect, the average net percent positive responses is calculated over the three categories. Each month's index value can range from 100, which would indicate that every survey respondent had a positive view about each of the three categories, to minus 100, which would indicate that all views were negative.

2. European Union Economic Sentiment Indicator ("ESI")

The Economic Sentiment Indicator ("ESI") of the Joint Harmonised E.U. Programme of Business and Consumer Surveys intends to track overall economic activity. The ESI is derived from 15 questions that are asked as part of five separate surveys of confidence that are conducted by members of the European Union ("E.U.").[18] Each of the five surveys focuses on sentiment in one industry or sector – Industrial Confidence, Services Confidence, Consumer Confidence, Retail Trade Confidence, and Construction Confidence. The ESI is based on a weighted average of 15 variables from the separate surveys. The surveys are conducted each month. The sample sizes from each E.U. member vary by country and by industry and segment.

Notably, the ESI incorporates survey responses from both households and businesses. The fifteen questions specifically used to calculate the ESI are directed at these topics: assessment of current overall order books (industrial); assessment of current stock of finished products (industrial); expectations regarding production over the next three months (industrial); change in business situation over the past three months (services); change in demand/turnover for the company's services over the past three months (services); expectations regarding demand/turnover for the company's services in the coming three months (services); expectations regarding changes in one's household financial position in the next twelve months (consumer); likelihood of saving money in the next twelve months (consumer); expectations regarding changes to the general economic situation in the country in the next twelve months (consumer); expectations regarding the number of unemployed in the next twelve

[18] European Commission Directorate-General for Economic and Financial Affairs, "The Joint Harmonised EU Programme of Business and Consumer Surveys – User Guide," (Updated July 4, 2007) *available at* http://ec.europa.eu/economy_finance/db_indicators/surveys/documents/userguide_en.pdf.

months (consumer); change in business sales activity over the past three months (retail trade); expectations regarding changes in business sales activity over the next three months (retail trade); assessment of the current volume of stock (retail trade); assessment of current overall order books (construction); and expectations regarding changes to the firm's total employment in the next three months (construction).

The calculation of the ESI itself is somewhat complicated. Basically, a "balance" is calculated for each of the 15 questions of interest that reflects the net difference between the positive and negative responses to the question. In some questions, the intensity of the response is a factor, and "very positive" and "very negative" responses are assigned twice the weight of merely "positive" and "negative" responses. Balances are standardized and seasonally adjusted.[19]

Four of the 15 component variables comprising the ESI calculation are associated with the Consumers survey, three are associated with the Industrial survey, three with the Services survey, three with the Retail Trade survey, and two with the Construction survey. However, the weights assigned to each group of variables are not strictly related to their number. For example, while three of the 15 variables (or 20 percent of the questions) are associated with the Industrial survey, the overall weight collectively assigned to these components of the "Industrial Confidence Indicator" is 40 percent. The overall weights assigned to the each sector's "confidence indicator" are as follows: Industrial (40%); Services (30%); Consumer (20%); Retail Trade (5%); and Construction (5%). To compute a weighted average, each sector's overall weighting percentage is divided by the number of opinion balances comprising its confidence indicator to determine each balance's (that is, each survey question's) individual weight. So, for example, Services Confidence Indicator has an overall weight of 30 percent and consists of three balances/questions; each balance/question in Services thus is assigned an individual weight of 10 percent (i.e., one-third of 30 percent). Further adjustments are made in the event that standardized and seasonally adjusted balances are not available for all 15 components.

Finally, the resulting weighted-average data series is scaled so that its long-term average over time equals 100 and its standard deviation equals 10. This monthly, scaled, weighted-average data series is the ESI. Values of the ESI greater than 100 indicate a comparatively positive economic sentiment at that time and values less than 100 indicate a comparatively negative sentiment.

E. Research Studies of Consumer Sentiment Indices

Over the past two decades, consumer sentiment indices were integral to a number of published, empirical, research studies in economics, finance, or statistics. These studies typically used data for the University of Michigan's Index of Consumer Sentiment (ICS), the Conference Board Consumer Confidence Index (CCI), or both.

Appendix A, which appears after concluding section VII, identifies 16 such research studies published since 1994. As a group, these studies illustrate that indices of consumer sentiment have long been

[19] Balances are standardized with moments that are calculated with a fixed sample to avoid periodically revising the index.

useful for forecasting or explaining a range of macroeconomic and other significant outcomes. These studies often concluded that consumer sentiment indices (among other variables) helped forecast or explain movements of GDP, stock prices, prices and yields on bonds, corporate credit risk, or expenditures on the outputs of specific industries.

These studies often analyzed whether, and to what extent, adding a measure of consumer sentiment improves forecasts of consumer spending, business cycle peaks and troughs, or other measures of macroeconomic or industry-specific variables. Results and conclusions vary somewhat with the studies' methods, variables, and time periods analyzed. Researchers have generally concluded that consumer sentiment indices did statistically-significantly and often-meaningfully improve forecasts or explain important outcomes.

IV. Building the Home Purchase Sentiment Index (HPSI)

A. Goals and Research Strategy

Our primary goal was to distill the information in each month's National Housing Survey (NHS) into a single number that reflects some of consumers' attitudes and financial conditions that importantly influence their decisions about purchasing homes. We sought to combine the responses to a small number of the NHS questions into a monthly measure that would provide insights to supplement those gleaned from other quantitative and qualitative analyses about upcoming housing market developments, such as house prices, home sales, purchase mortgage origination volumes, and housing starts.

The National Housing Survey (NHS) polls adults across the United States each month about their housing-related experiences, conditions, and attitudes. Because each respondent is asked about 100 questions, the NHS provides more prompt, regular information about housing than any other survey of consumers. The NHS asks both home owners and renters about owning and renting homes, home and rental prices, homeownership distress, household finances, and overall confidence in the economy.

Ultimately, we used a simple average of the (net-positive responses to) six NHS questions to summarize consumers' conditions and attitudes about purchasing homes. In keeping with widely-accepted concepts and terminology in consumer surveys, we refer to the summary measure as the Home Purchase Sentiment Index (HPSI).

Below we explain the process that we used to develop the HPSI.

B. NHS Questions for the HPSI: Preliminary Candidates

We began by choosing a long list of preliminary candidate questions to include in the HPSI. We chose a list of 28 NHS questions as preliminary candidates on the basis of availability, of *a priori* judgments, and of their simple correlations during 2010-2014 of important housing market outcomes with the (responses to) the candidate NHS questions.

Because one goal is to produce HPSI on an ongoing basis, we only considered questions that are still being asked in the NHS in 2015. Because the NHS is relatively new, we favored, but did not insist on, questions that were in the monthly NHS since its beginning in June 2010.[20]

Then, before analyzing them statistically, we judged which NHS questions were likely to have empirically-meaningful and plausibly-reliable connections to important housing market outcomes. Recent experience testifies to the likely value of such judgments. Based on judgments made before the NHS had accumulated much data, Fannie Mae began including aggregate responses for a dozen NHS question on its website in July 2011. As it happened, of the six

[20] Q11B and Q112B were not asked until the March 2011 National Housing Survey.

questions that we chose for the HPSI, five of them were among the dozen questions that began appearing in 2011 on the Fannie Mae website.

The 28 preliminary candidates cover a wide range of topics that might provide signals about housing markets. Some questions ask about personal, and some ask about national, economic and financial developments and outlooks. One asks directly about whether it is a good time to buy a home; another asks whether it is a good time to sell. Some questions ask about expected changes and variability of house prices. Some ask whether it is difficult to obtain or to make payments on mortgages. Some ask about intentions and reasons for buying or renting in the future. Table IV-1 below shows the 28 preliminary candidate questions that we analyzed.

Table IV-1

NHS Preliminary Candidate Questions for the HPSI

Question Number	Question Text	Question Topic
Q10	In general do you think our economy is on the right track or is it off on the wrong track?	Current economy
Q11	Looking ahead one year, do you expect your personal financial situation to get much better, somewhat better, stay about the same, get somewhat worse, or get much worse?	Personal financial situation: Future
Q11B	Now looking back over the past year, has your personal financial situation gotten much better, somewhat better, stayed about the same, gotten somewhat worse, or gotten much worse?	Personal financial situation: Recent
Q12	In general, do you think this is a very good time to buy a house, a somewhat good time, a somewhat bad time, or a very bad time to buy a house?	Good time to buy a house
Q13	In general, do you think this is a very good time to sell a house, a somewhat good time, a somewhat bad time, or a very bad time to sell a house?	Good time to sell a house
Q15	During the next 12 months, do you think home prices in general will go up, go down, or stay the same as where they are now?	Future home prices rise: Whether
Q16&Q17	Q16 (IF Q15 = DOWN): By about what percent do you think home prices in general will go down on the average over the next 12 months? Q17 (IF Q15 = UP): By about what percent do you think home prices in general will go up on the average over the next 12 months?	Future home prices rise: How much
Q18	During the next 12 months, do you think home rental prices in general will go up, go down, or stay the same as where they are now?	Future rental prices rise: Whether

Q19&Q20	Q19 (IF Q18 = DOWN): By about what percent do you think home rental prices in general will go down on the average over the next 12 months? Q20 (IF Q18 = UP): By about what percent do you think home rental prices in general will go up on the average over the next 12 months?	Future rental prices rise: How much
Q20B	During the next 12 months, do you think home mortgage interest rates will go up, go down, or stay the same as where they are now?	Future mortgage interest rates rise: Whether
Q22	Do you think it would be very difficult, somewhat difficult, somewhat easy, or very easy for you to get a home mortgage today?	Difficult to get a mortgage
Q31	If you were going to move, would you be more likely to: 1) Rent 2) Buy 3) Don't know	Next home owned
Q46B	Which of the following is the best reason to buy a house? 1) The financial benefits of homeownership, such as its value as an investment (especially compared to paying rent), its value as a way to build up wealth for retirement or to pass on to your family, and the tax benefit 2) The broader security and lifestyle benefits of homeownership, such as providing a good and secure place for your family and children, where you have the control to make renovations and updates if you want, and in a place that's in a community and location that you prefer 3) Don't know	Best reason to buy a house
Q47	Which is closer to your view? 1) Renting makes more sense because it protects you against house price declines and is actually a better deal than owning. 2) Owning makes more sense because you're protected against rent increases and owning is a good investment over the long term. 3) Don't know	Owning vs. renting
Q50	In the future, are you (renter) more likely to: 1) Always rent 2) Buy at some point in the future 3) Don't know	Future home rented: Renters
Q75	Do you think buying house is an investment with: 1) Safe investment with a lot of potential 2) Safe investment with very little potential 3) Risky investment with very little potential 4) Risky investment with a lot of potential	Buying house as investment
Q82	Which of the following best describes the type of mortgage you have?	Type of Mortgage
Q87	If a person's home is now worth less than what they owe on it, do you think it is okay for them to stop paying their mortgage?	O.K. to stop paying mortgage

Q91	Thinking about the total amount you owe on your home (including first mortgage, second mortgage, and home equity line of credit debt) compared to the value of your home today, would you say the total amount you owe on your home is higher/lower than your home value?	Home underwater
Q99	Thinking about the value of your home today compared to what you paid for the home, would you say your home is worth more/less than what you paid for?	House price gains: Past
Q100	Have you seriously considered, somewhat considered, not seriously considered, or not considered at all stopping or incompletely paying your mortgage?	Consider stop mortgage payment
Q109	Are you very stressed, somewhat stressed, not very stressed or not at all stressed about your ability to make payments on your debts?	Stressed about debt payments
Q111	Do you feel you have sufficient savings?	Have sufficient savings
Q112	Do you feel that your current household income is sufficient for the amount of expenses you have, including any payments on debt and mortgages?	Have sufficient income
Q112B	How concerned are you that you will lose your job in the next twelve months?	Job-loss concerns
Q116	How does your current monthly household income compare to what it was twelve months ago?	Household income increased
Q117	How do your current monthly household expenses compare to what they were twelve months ago?	Household expenses increased
Q118	How does the total amount of debt on your house, including first mortgage, second mortgage, and home equity line of credit debt, compare to twelve months ago?	Household debt increased
Source: National Housing Survey		

C. Paring Down the Preliminary List of Candidate Questions

1. Iteratively reducing the number of questions

The Michigan sentiment and the Conference Board confidence indices, the two, best-known, national, long-running, highly-regarded consumer indices, are each constructed from (the responses to) five of their surveys' questions. Although there is no analytical imperative, in practice, consumer and housing market indices are often based on about that number of survey questions or of data series. In light of the length of our data sample and of common practice, we were initially inclined to use about that number of questions to construct the HPSI.

We first pared down our "long list" of 28 preliminary candidate questions to a "short list" of about 10 candidate questions. One tool that we used to guide our selection of short-list questions was "stepwise regressions." The results of the stepwise regressions identified which questions were most, and which were least, correlated with relevant housing market outcomes. These statistical results provided some signals about how informative candidate questions were likely to be about housing markets and thus about which questions to retain for further analysis and which questions to be pared from the long list of candidate questions.

We used a blend of "automated" and "manual" stepwise regressions as follows:

1. We selected four variables to represent important aspects of housing markets: house prices, total home sales, single-family starts, and purchase-mortgage originations.[21]

2. We regressed the future values of each of the four housing market variables on current values of all 28 preliminary candidate questions, which are shown in Table IV-1. The regression for each housing market variable, or outcome, also included as a right-hand-side variable its own, recent, past value, i.e., we included a lagged dependent variable.

3. As future values of each of the four housing market variables, or outcomes, we used their values both over the upcoming six months and over the upcoming 12 months.

4. We then estimated "automated" stepwise regressions. The "backwards" automated procedure began by regressing each of the four future housing market outcome variables on all 28 preliminary candidate questions. The procedure then dropped the statistically-least-important candidate question and re-estimated the regression with the remaining 27 candidate questions. The automated procedure repeated, dropping one variable after each regression, until each of the remaining variables passed the conventional test of statistical significance at the five percent level.[22]

5. We then used a "manual" method to potentially further reduce the numbers of remaining candidate questions. In an informally iterative way, we used judgment and statistical results to decide which of the remaining candidate questions to retain. We generally removed questions whose estimated, stepwise-regression coefficients (or relationships) we deemed to have the "wrong" signs. For example, if the regression estimates implied that future home sales would be higher when NHS respondents expected more unemployment, we were likely to delete that question from the ensuing regressions for future home sales. After such deletions, we examined the resulting regression estimates and judged whether any more questions warranted deletion.

6. After we judged that no more questions warranted deletion from any of the outcome regressions, for each outcome we estimated a stepwise regression that started with the resulting, shorter list of candidate questions. Like step 4, at each iteration here, the automated stepwise procedure deleted the question that added to the least to the explanation of the

[21] Sources and details about these variables are given in Appendix B: Data and Sources.

[22] 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 outcome. The stepwise procedure continued iterating until each of the remaining questions was statistically significant at the five percent level or better.

2. Regression results

Table IV-2 displays the results of our procedure. The regression results show the magnitudes of the estimated connections of each measure of future housing market outcomes and the NHS questions that remained at the end of our iterative procedure.

These estimates easily could be used for forecasting outcomes over the next 11 months because they rely only on data that we would easily have in hand—the answers to the NHS from one month earlier.

We used various indicators to provide information about the individual NHS questions' forecasting the four outcomes in Table IV-2. The levels of statistical significance, denoted by asterisks, in Table IV-2, provide information about the (in-sample) forecasting performance of individual questions for each of the four outcomes, taken one by one. In Table IV-2, we denote significance at the 0.05 level by a single asterisk and greater, 0.01 level significance by two asterisks. A more precise measure is the significance level itself of each question for each outcome. By construction, Table IV-2 shows the questions that significantly improved the forecasts of at least one of the outcomes. Table IV-2 also shows that Q18 and Q20B significantly improved forecasts for all eight of the outcomes.

NHS data are available through the end of the most recent month. The odd-numbered columns show the results over 12-month horizons; the even-numbered columns show the results over six-month horizons, which can be based on six more observations of actual, future outcomes than the 12-month-horizons regressions.

Table IV-2 shows that, for both the 12-month-ahead and the 6-month-ahead horizons, each housing market outcome was statistically-significantly connected to at least four of the remaining nine NHS candidate questions, in addition to the effects of the other, included questions. Coincidentally, when both the half-year and full-year horizons are counted, each outcome had nine significant connections to the remaining NHS questions.

Noteworthy in Table IV-2 is the absence of Q12, which asked consumers whether it was a good (or bad) time to buy a house. We omitted Q12 there because it had no detectable connections to future housing market outcomes when we also considered other candidate questions.

Q20B asks whether, not how much, respondents expect mortgage (specifically) interest rates to rise over the next 12 months. Q22 and Q109, for which estimated coefficients are shown in rows 6 and 7 of Table IV-2, asked respondents about perceived problems, *ex ante* and *ex post*, with mortgage credit. Q22 asked whether mortgages are difficult to get. Given the enormous

Table IV-2

Connections of Future Housing market outcomes to Current National Housing Survey Questions

	Independent Variables	Dependent Variables: Housing market outcomes Over Next 12 or 6 Months							
		House Price Growth		Home Sales		Single-Family Starts		Purchase-Money 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, 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. Responses to NHS questions were not seasonally adjusted.

amount of discussion about tight credit over 2010-2014, we expected that Q22 might be particularly informative. It wasn't.

Because of the amounts and concerns about home owners' being underwater and households' being highly leveraged and attempting to de-lever, the NHS asked whether respondents felt stress about their debt payments, Q109.

The NHS also asked whether respondents' incomes rose over the past year (Q116). Recent income gains forecasted future outcomes better than recent financial gains (Q11B, which is not shown) did. At some other times and for some other housing outcomes, forecasts might be improved by using one or the other (or both) of these questions. To the extent that other consumer surveys ask one or the other, but not both, of these questions, the NHS's asking about both households' recent income and financial changes gives an advantage to users of the NHS.

House price growth

House price growth proved to be only weakly connected over our 2010-2013 estimation period to whether consumers expected home prices to rise (Q15) and to how much they expected home prices to rise (Q16&Q17). Only for the six-month horizon and then only with small effect (0.01) were future home prices connected to consumers' expectations (Q16&Q17).

In addition to the unusual housing markets during 2010-2014, which certainly may have affected our results, the quantitative responses about how much house prices were expected to rise were also unusual. Although national-average, 12-month house price growth rates generally change quite slowly, making them relatively more predictable than many other financial and economic variables. Nonetheless, long after the crisis had faded and housing stabilized, the survey-average of expected, 12-month home price growth trailed far below actual house price growth during our sample period.

Perhaps more concerning, even after many months of 4-8 percent house price growth, individual respondents very often answered that they expected zero-percent growth and surprisingly-many answered with seemingly-extreme forecasts for national-average, 12-month home-price growth rates, e.g., -15 percent, +20 percent, and so on. It may be that more analysis of the data would suggest ways to adjust either the individual or aggregate responses that would provide more informative measures of what households expect. For responses about expected home-price growth, it may more informative to report and analyze data that has been adjusted, perhaps by either recoding responses that are more than two standard deviations above or below the average responses to equal the two-standard-deviation amounts or omitting them altogether. Currently, for public releases, national-average expected home-price growth rates are calculated after omitting such outliers.

Like individuals' quantitative responses about house prices, expected mortgage interest rate changes were often unusual and extreme. Nonetheless, and 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 as 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 good time to sell and whether house prices, rents, and mortgage rates were expected to rise, and stress about debt payment.

Single-family starts

More responses that it was a good time to sell also forecasted more housing starts. Expectations of higher rents and lower mortgage interest rates and more responses that mortgages were easy to get were associated with more starts in the future.

Purchase-money originations

More (dollar-volume of) originations in the future were also connected to 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. Future originations were also higher when fewer consumers reported that they were stressed by their debt payments.

Summary statistics

Since only significant questions are retained in Table IV-2, each column forecasts significantly. One measure of the in-sample forecasting performance of the estimates, taken column by column, is shown in the bottom row: R-squared (or R^2). R-squared is the percentage of each outcome's total variation that the estimates in each column accounted for, or explained. Given that we had a relatively small number of national-aggregate observations (absolutely, and relative to the numbers of included questions) and given that we selected variables mostly on the basis of their forecasting contributions, it is supportive, but certainly not surprising, that the bottom row shows that the R-squared statistics ranged from 85-94 percent.

In addition to assessing their forecasting performance outcome by outcome, we were also interested in individual questions' improving forecasts for these four outcomes taken as a group. As a measure of the breadth or range of outcomes that a question affected, Table IV-2 shows counts of the times that each NHS question was statistically significant and thus appeared in Table IV-2. Although such counts can have shortcomings as a summary of the total contribution of a question across outcomes, we

expect that the questions that affected more outcomes and horizons might bear stronger and more consistent relations to the overall condition of the housing market.

Table IV-3 shows the significance counts for the nine questions in Table IV-2. Eight of the ten questions below were explicitly in Table IV-2; because Q15 and Q16-17 ask whether and how much respondents expect house prices to grow, Table IV-3 combines the counts for Q15 and Q16-17. Table IV-3 also includes the counts for two questions that did not appear in Table IV-2: Q12 and Q112B.

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. The question seemed to ask for answers that would be based on respondents' overall assessments about housing. Over longer and perhaps-less-exceptional periods of time, fluctuations in our four outcomes (future house prices, home sales, purchase-money (mortgage) origination volumes, and single-family starts) seemed very likely to have been driven by home buyers' overall assessments of housing markets.

Table IV-3

Number of Significant Connections in Forecast Regressions

Question Number	**Question Topic**	**Significant Connections in Table IV-2**
Q12	Good time to buy a house	0
Q13	Good time to sell a house	6
Q15 or Q16&Q17	Expectations of higher home prices	6
Q18	Expectations of higher rents	8
Q20B	Expectations of higher mortgage rates	8
Q22	Difficult to get a mortgage	3
Q109	Stressed about debt payments	3
Q112B	Concerns about job loss	0
Q116	Household income increased	1
Q117	Household expenses increased	1

Indeed, rather than insignificance, our initial concerns were that Q12 might be too significant: "Good time to buy" would significantly forecast these outcomes—but might "Good time to buy" might be such a powerful forecaster itself that it left no room for other NHS questions to add significantly to

forecasts of these outcomes. And, researchers have found analogous questions to significantly forecast car sales and other economic variables.[23]

The results surprised us.

Strikingly, Q12, good time to buy a house, does not appear in Table IV-2. As row 1 of Table IV-3 shows, the reason it does not appear, in the presence of the other estimated effects there, is that it didn't significantly add to forecasts of any of the outcomes: Its significance count was zero. "Good time to buy," Q12, just didn't pass our stepwise-procedure tests for any of the four housing market outcomes.

Nonetheless, as we explain below, we used Q12 to construct the HPSI.

Indicators of employment conditions often appear in other consumer indices. Two of the five questions in the Conference Board's Consumer Confidence Index focus on the job market. Notably, Q112B, job-loss concerns, does not appear in Table IV-2 and indicates that Q112B passed none of the significance tests at the end of our iterative stepwise estimation procedure.

Because Q112B, concerns about job loss, was first asked in the March 2011 NHS, we have nine fewer months of observations for Q112B than we have for the other questions in Table IV-2. To assess the forecasting performance of the NHS questions, we preferred to estimate the forecasting relations over the longest period for which we had data for all of the questions. Two factors that influenced our choice were that (1) the estimation period was relatively short and perhaps atypical even when we did not truncate it at March 2011 rather than at June 2010 and (2) results from short samples might be especially sensitive to our iterative, stepwise procedure. Thus, rather than truncate all of the estimation periods in Table IV-2 by nine months, we excluded Q112B from the estimation and tests that led us to Table IV-2. Nonetheless, because we judged that job-loss concerns will be quantitatively important and reliable signals for understanding and forecasting housing market outcomes, we chose to include Q112B in our prototype HPSI.

[23] See Pence, et al. (2014).

D. Component Questions of the HPSI

1. Selection of the six component questions

From the ten questions in Table IV-3, we selected six questions to be the components of a prototype HPSI. Table IV-4 lists the six component questions. (Table IV-1 contains the full text of the questions.)

Table IV-4

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

NHS Question	Question Topic	Time Period Covered
Q12	Good time to buy a house	Now
Q13	Good time to sell a house	Now
Q15	Expectations of higher home prices	Next 12 months
Q20B	Expectations of higher mortgage rates	Next 12 months
Q112B	Concerns about job loss	Next 12 months
Q116	Household income increased	Past 12 months

We sought a collection of component questions that would bring in information about the factors that drive Home Purchase decisions: incomes, interest rates, and house prices--whether experienced or expected. We also wanted the HPSI to incorporate households' confidence about those factors because home ownership entails large and potentially costly financial and social commitments. We sought questions that would likely reflect home buyers' considerations that are perennial, but neither constant nor fleeting. We sought questions that were more likely to bear a steady relation to future housing outcomes. We sought questions that had some track record of helping to forecast, regardless of whether they caused, future housing market outcomes. In deciding which questions to choose, we used statistical evidence of the sorts shown in Table IV-2 and summarized in Table IV-3 based on NHS data for 2010-2014. In addition, Section VI provides statistical evidence based on data from the Michigan Survey of Consumers for 1992-2013 that supports the selection of questions that we used to build the HPSI. And, ultimately, we used judgment, sometimes to fill in for missing evidence and sometimes to overrule the evidence.

The six component questions differ in how much they stack up against these criteria. In addition to their logical appeal, Q13, Q15, Q20B, Q116 had considerable statistical support in Table IV-2. While the *a priori* case for including Q12 seemed quite strong, the statistical evidence over 2010-2013 was much less convincing. On the other hand, the statistical evidence based on Michigan survey data for the much-longer, 1992-2013 period more strongly suggests that "good time to buy" can provide

reliable signals about future housing market outcomes. In the end, including Q112B was based on judgment.

2. The six component questions: 2011-2015

Figure IV-1 shows the HPSI (thick black line) for March 2011–July 2015 and its six components. Below, we describe and explain how we calculated HPSI and analyze its movements over 2011-2015.

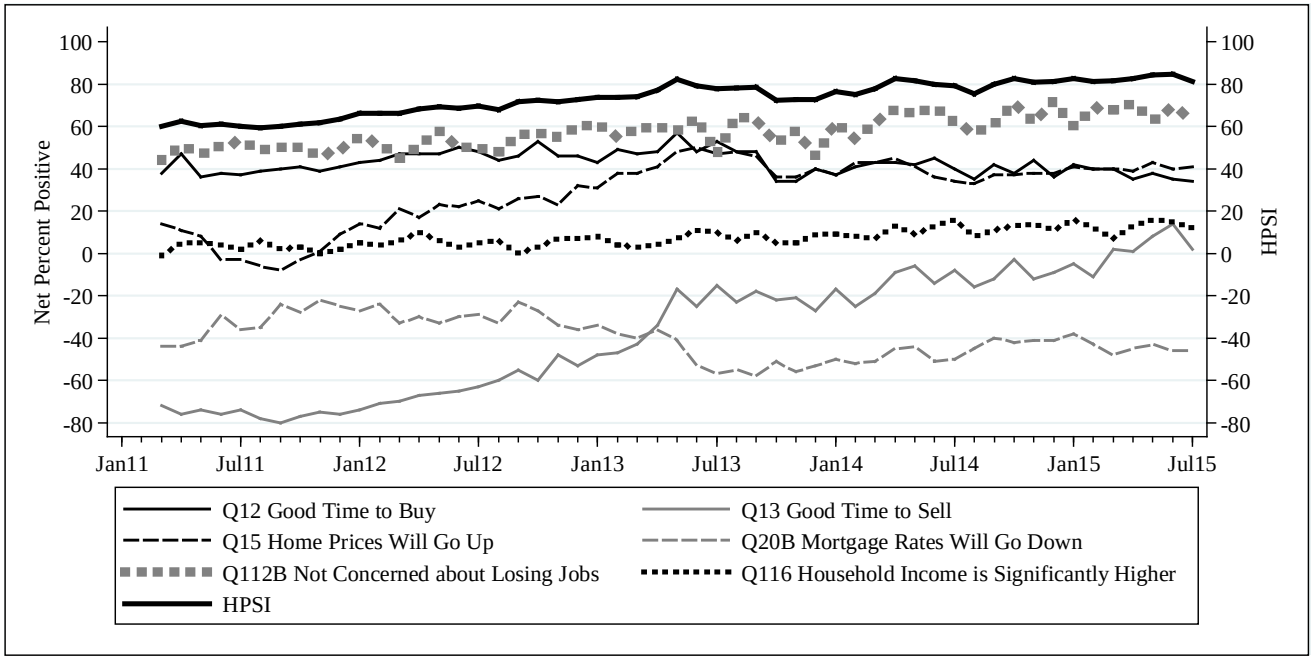


Figure IV-1: HPSI and Its Six Component Questions

(Monthly, not seasonally adjusted, March 2011 – July 2015)

For each NHS question, including the six HPSI component questions, we calculated the net percent of positive responses from the national survey of the general population. Table IV-2 showed that housing market conditions 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 IV-1 rose when these two questions signaled stronger housing market conditions, Figure IV-1 plots the negative of their net percent positive responses. That is, Figure IV-1 shows the net percent of negative responses, i.e., the percent of respondents who expected that mortgage rates would fall and the net percent of respondents who were not concerned about job loss. In addition, the data for the component questions in Figure IV-1 also remind us that the net percent positive (or negative) can be either positive or negative.

The monthly NHS began in June 2010. So that Figure IV-1 covers the same period for each component, we show data beginning in March 2011, when the NHS began asking respondents about their job-loss concerns (Q112B), and thus when we can first calculate the HPSI .

In Figure IV-1, we plotted the HPSI and the NHS questions about “good time to buy a house” (Q12 (black, solid line)), “good time to sell a house” (Q13 (gray, solid line)), and “expectations of higher home prices” (Q15 (black, dashed line)). It also plots the other three component questions: “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)).

The net percent positive of those who responded that it was a good time to buy a house, Q12, was always strongly positive during this period. (Later, we show that the same question in the Michigan Survey of Consumers was always positive during 1992-2013.) 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. While its mean was high, in light of the changes in housing markets and the changes in responses to other questions since the crisis, the variation over time (or volatility) of Q12, whether it was a good time to buy a house, was surprisingly low.

The path of Q13, whether it was a good time to sell a house, was rather different. 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, rather than gently rising and falling like “good time to buy a house” did, “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, Q15, hovered around 10 percent during 2011 and then rose steadily through the middle in the middle of 2013. Since then, it has tended to decline a little, but still remained at nearly 40 percent net percent positive at the end of 2014.

The net percent positive responses to whether mortgage rates would fall, Q20B (gray, dahsed line), ranged from minus 20 to minus 40 percent. That is, for each month from March 2011 through September 2014, respondents on balance 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.

Especially in light of the sophistication, efficiency, and integration of long-term bond and mortgage markets, it is striking how many respondents each month forecasted the direction that mortgage interest rates would move. It is also striking how often and how large the net percent of respondents expected higher rates. But, for forecastng purposes, rather than its mean, what is most likely to be relevant is the time path of Q20B. And, as Table IV-2 showed, when more respondents expected mortgage rates to drop, future housing market outcomes turned out to be signficantly and consistently stronger. Indeed, Q20B is the only HPSI component that significantly improved forecasts of all eight of the housing market outcomes in Table IV-2.

The net percent of respondents’ with incomes that were higher over the past year, Q116, was positive and tended to rise slowly over this entire period. As a result, late 2014 witnessed the largest percent of

respondents who had recent income gains. If the economy was booming, labor markets were tight, and inflation was closer to its historical averages, we might expect to see high and volatile values for Q116. We don't. Thus, it is not very surprising that Q116 would be quite low, though positive, and stable as a result of the historically-tepid recovery of labor markets since the Great Recession. When the economy, and especially labor markets, become more vibrant, both the mean and the volatility of Q116 seem likely to rise. As they do, Q116 may become more informative about future housing market outcomes.

Concern about job loss and about starting or re-starting employment has been deservedly high by historical standards since the financial crisis began. Even so, the great majority of respondents have not been concerned about job loss over the next 12 months. Note that if 80 percent were not concerned and 20 percent were concerned, then a net positive 60 percent were not concerned, as recorded in 2012. Apart from a stall during the second half of 2013, the net percent not concerned has tended to rise. Thus, concern about near-term job loss was somewhat less pervasive in 2014 than it had been during 2011-2013. These slowly declining concerns about job loss comport with the low and slowly-rising net percent of respondents with higher incomes.

3. 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[24].

$$HPSI = \frac{Q12+Q13+Q15+Q20B+Q112B+Q116}{6} + 63.5$$

To calculate the value of the HPSI for each month, one simply sums, and then divides by six, the values of the six component questions that are shown in Figure IV-1. The only other step, which we do for some technical and presentation reasons, is to add 63.5 to the average of the net percent positive responses. Adding 63.5 makes the initial value (March 2011) of the HPSI equal 60.

The HPSI as an "equal-weighted" index in that we take an ordinary average, rather than a weighted average, of the questions. Using equal, as opposed to data-based or otherwise-selected, 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 or decisions. Second, equal weights are much easier to explain and comprehend than weights that are different across questions or across time. Third, it is common, though not universal, for consumer indices to have equal weights; for example, the Michigan Index of Consumer Sentiment has, for decades, applied equal weights to an unchanged-list of component questions.

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

Fourth, the cases for unequal weights almost certainly differ with markets, time periods, and goals. To the extent that data affects what weights are used, we should anticipate that continually-incoming data would also suggest changing weights through time. Good arguments can surely be made for weights that do change over time in light of additional data. Those arguments sensibly convince most governments to change weights frequently, for example when they calculate some price indices. (The weights used to calculate the CPI change rarely and according to a schedule not new data.)

Changing weights, however, are nettlesome. A major drawback is that changed weights often beg for revising the past values of a data series like the HPSI. If the weights applied to the components don't change, and since the respondents' answers to the NHS are recorded once and for all, then there is no reason to re-state past values of the HPSI.

Seasonal adjustments can also be a source of data revisions. We advocate not seasonally-adjusting either the questions or the HPSI. Analysts most often work with seasonally-adjusted economic data. We have evaluated the HPSI and its components relative to seasonally-adjusted data for housing market outcomes. (The separate weight applied each month to each respondent to make national totals representative of the general population do change over time. We understand that the net effects of these weights on national totals are likely to be minor.)

The HPSI is calculated with equal weights; that is, each of the six series has a weight of 1/6. But, generally, and here surely, those equal weights don't mean that each series will contribute equally. With equal weights, instead, the more variable a component series is, the more that it tends to contribute to the movements of the average. The HPSI is an example. The HPSI rose and fell due more to the three, more-volatile components during 2011-2014 (good time to sell, home prices will go up, mortgage rates will go up) than by the other, steadier components. Indeed, because of HPSI's equal weights, the changes (divided by six) in the net percent positive of each component in Figure IV-1 show how much it changed HPSI.

4. The Home Purchase Sentiment Index: 2011-2015

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 IV-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. HPSI rose in early 2014 due to a broad-based increase in its components. More respondents considered it a "good

time to sell a house", concerns about job loss retreated by the most since 2011, and more respondents expected mortgage interest rates to fall. But, the HPSI reversed course in the spring and fell through the summer of 2014. Fewer respondents thought that it was a "good time to sell a house," but the greater contributors to the HPSI decline then were the declines in the net percentages of respondents who expected "home prices will go up" and who said that it was a "good time to buy." The HPSI rose during the autumn of 2014. Each of the components boosted the HPSI through October. The decline toward the end of 2014 stemmed from fewer respondents saying that it was a "good time to sell a house", and that their incomes had increased over the past year.

E. Extending and Capitalizing on the HPSI

In contrast to nationally-representative HPSI that we calculated above, here we calculate a HPSI for some specific groups and regions of interest. Once decisions are made about which groups to focus on, calculating HPSI for them is virtually as fast and easy as calculating the national HPSI. To illustrate, Table IV-5 shows summary statistics for groups that differed (1) by income, (2) by age, (3) by housing tenure, or (4) by geographic region. We could just as easily calculate HPSIs, for example, for married people in the Northeast, for younger people with higher-incomes, or for younger renters with higher incomes.

Table IV-5

Summary Statistics for Group-Specific HPSIs

(March 2011 – July 2015)

		Mean	Std. Dev.	Min.	Max.
	Group	**(1)**	**(2)**	**(3)**	**(4)**
1.	**National**	73.3	7.8	59.3	84.7
	Income (household, annual)				
2.	< $50,000	67.3	7.0	53.3	81.7
3.	$50,00-$100,000	77.1	8.8	58.8	92.3
4.	> $100,000	81.4	10.3	60	96.8
	Age (years)				
5.	18-34	75.5	7.6	58.7	87.2
6.	35-44	73.2	8.9	52	89
7.	45-64	71.4	8.1	56.2	82.7
8.	65+	76.9	7.7	61.3	88.2
	Housing Tenure				
9.	Owners	75.2	8.6	59.3	86.2
10.	Renters	69.9	6.8	58.5	83.3
	Region				
11.	Northeast	71.7	6.9	56.7	85
12.	Midwest	75.1	8.3	60	90.5
13.	South	72.3	7.7	57.2	83
14.	West	74.7	9.4	56.8	90

As we disaggregate the national sample more and more, the resulting subsamples each have fewer and fewer respondents upon which to base their HPSIs. For example, separating one thousand respondents in a national sample into four regions with equal numbers of respondents and then splitting the 250 Western respondents into three, similar-size, age groups leaves about 85 respondents upon whom we could base a HPSI for young Westerners. While there can be benefits of such disaggregated HPSIs, one of the costs of the smaller samples is that they leave us with less confidence about how closely the resulting HPSIs would track the average sentiment of young Westerners. Nonetheless, disaggregated HPSIs might often provide insights whose benefits more than justify their costs.

Column 1 of Table IV-5 shows the mean value during March 2011 – July 2015 for each group's HPSI. Rows 2 - 4 show the means and other summary statistics for the HPSIs of lower-, medium-, and higher-income households, with dividing lines at $50,000 and $100,000 of annual household incomes. We expect that the much-higher mean value of the HPSI for the higher-income respondents (80.4) than

for the medium-income and lower-income respondents (75.3 and 66.0) reflects both longer-run and shorter-run conditions. Higher-income households have long had higher homeownership rates. And, in the aftermath of the recent financial crisis, the recovery of jobs that provided lower incomes has been weaker than of higher-income jobs. Columns 1 and 2 shows that the HPSIs of lower-income, renter, and Northeast groups tended to have both lower means and lower volatilities.

Figure IV-2 through Figure IV-5 plot the monthly values of the HPSIs for each of the groups listed in Table IV-5. They also plot the (national) HPSI (black line). The strong, upward trend of the (national) HPSI over the March 2011 – July 2015 period was accompanied and followed by recuperation of housing market from the financial crisis and the Great Recession. During this period, the HPSIs of these large groups often mirrored the (national) HPSI.

To the extent that the component questions reflect national conditions, we would expect groups' HPSIs to track and thus be correlated with the national HPSI. For example, expectations about mortgage interest rates would reflect national conditions and thus would not generally differ much across groups. Concerns about job loss, however, might reflect conditions in specific sectors or regions relatively more, even if those concerns stemmed from expected changes in interest rates.

While all of these HPSIs tended to rise over the entire period, Figure IV-2 through Figure IV-5 also show that groups' HPSIs often moved substantially differently, in magnitude, in timing, or even in direction. Here we highlight a few examples. In the summer and early fall of 2011, when the federal government debt-ceiling crisis was fermenting, the HPSIs of lower-income and of younger respondents declined and then rebounded less than the HPSIs for other groups. These groups might well have been less exposed to disruptions in bond markets or other repercussions of a government debt default. Similarly, the HPSI of home owners advanced noticeably relative to that of renters in the first half of 2013, when house prices were rising strongly.

While rising house prices then probably made it easier for home owners to buy homes, they simultaneously made home buying more difficult for renters. And, as Figure IV-4 shows, during the most recent period, the HPSI for the West clearly rose relative to that for the rest of the nation. These examples remind us that national factors are unlikely to dominate housing markets in most future periods as much as they did over the past decade of housing market boom, bust, triage, and recuperation. In those periods, the differences in HPSI movements across groups may appear to be, and may well actually be, larger than recently observed. Then, having HPSIs by group may prove especially valuable.

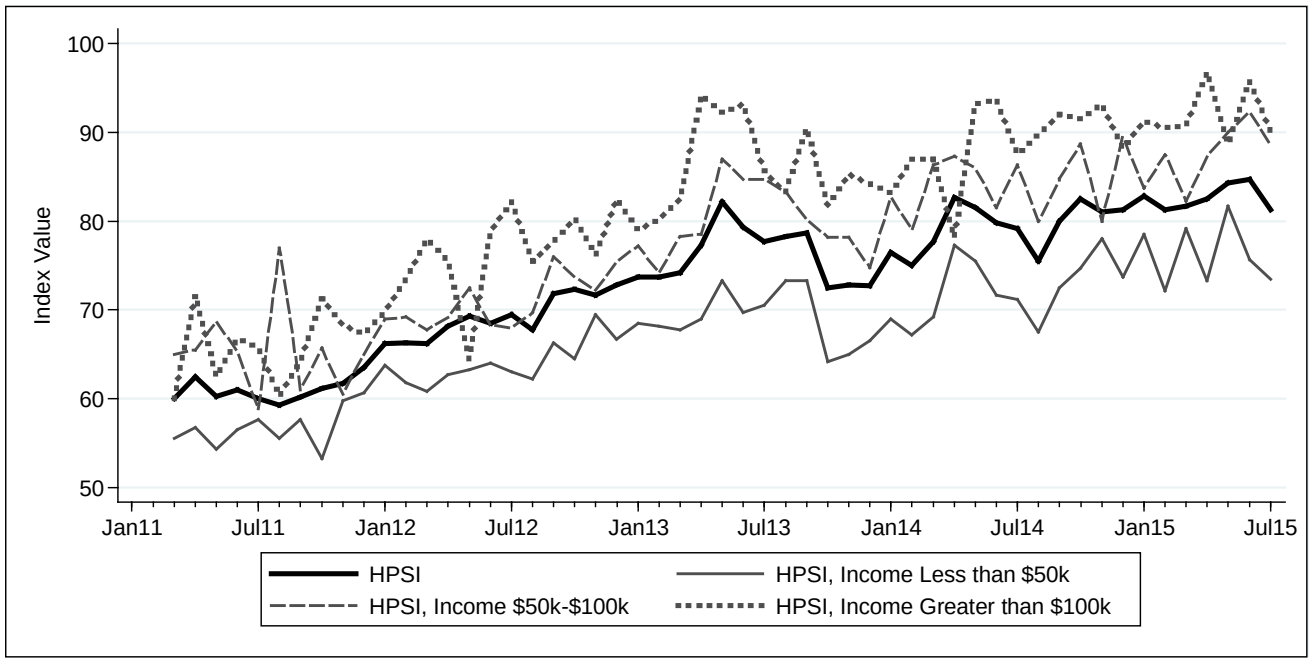
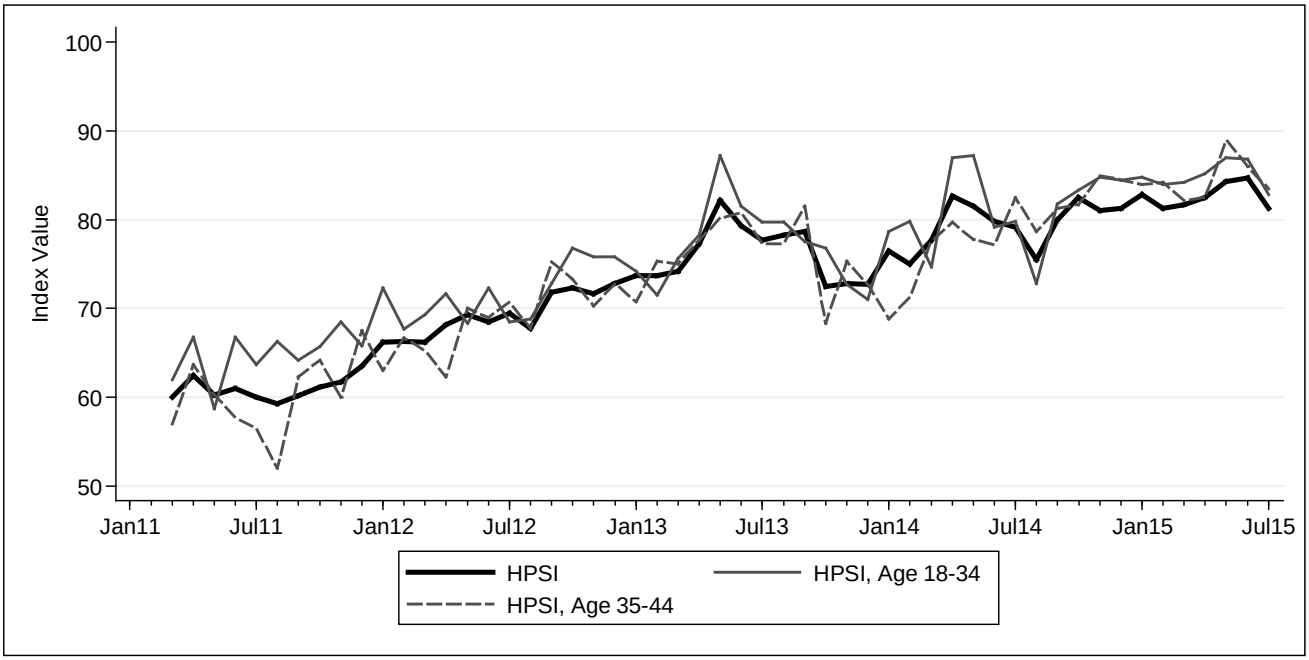


Figure IV-2: HPSI by Income

(Monthly, not seasonally adjusted, March 2011 – July 2015)

Panel A



Panel B

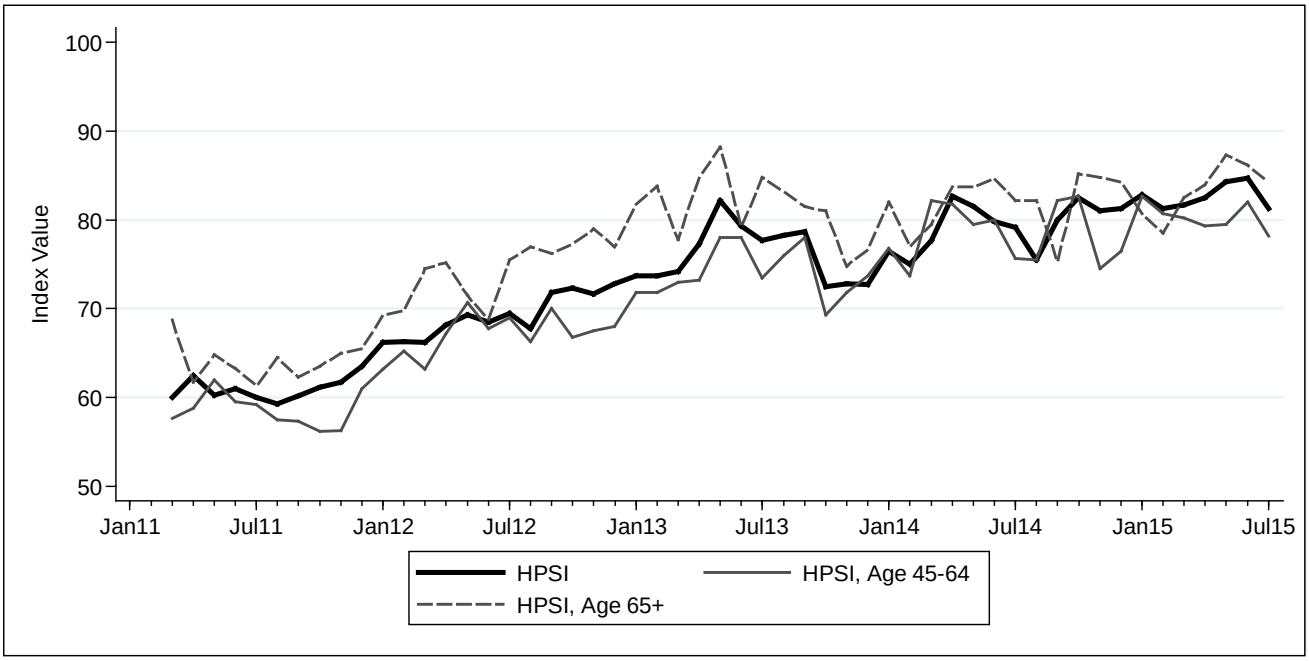
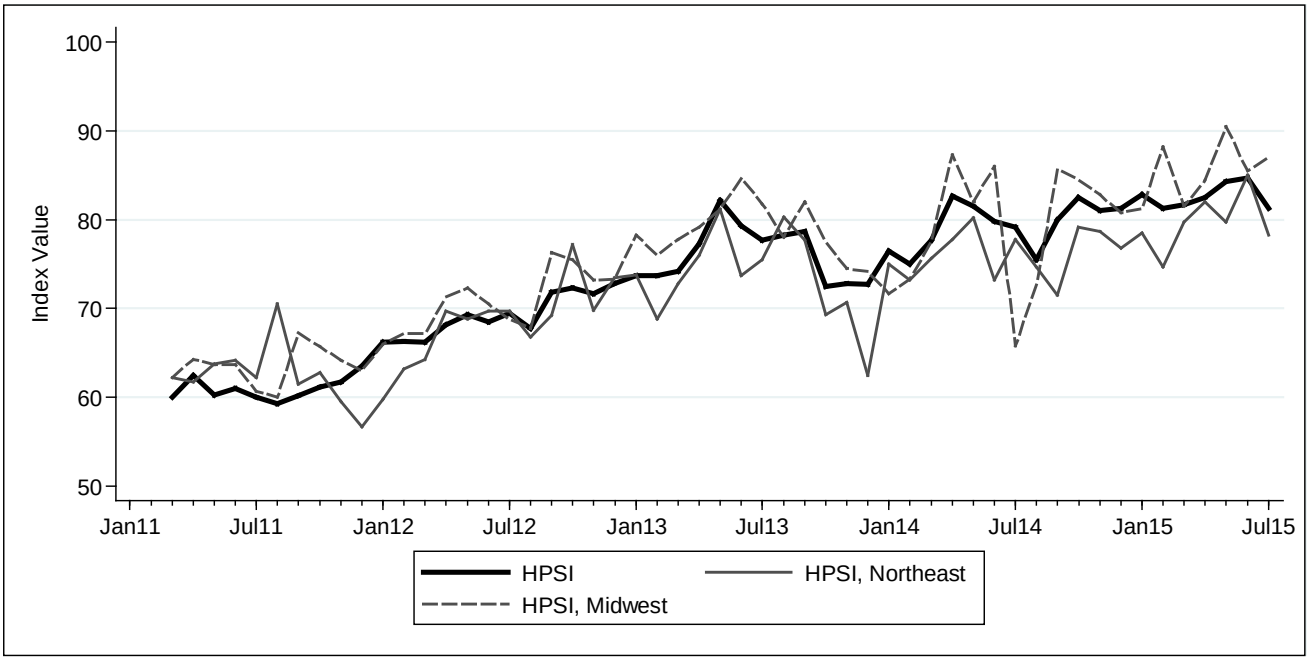


Figure IV-3: HPSI by Age

(Monthly, not seasonally adjusted, March 2011 – July 2015)

Panel A



Panel B

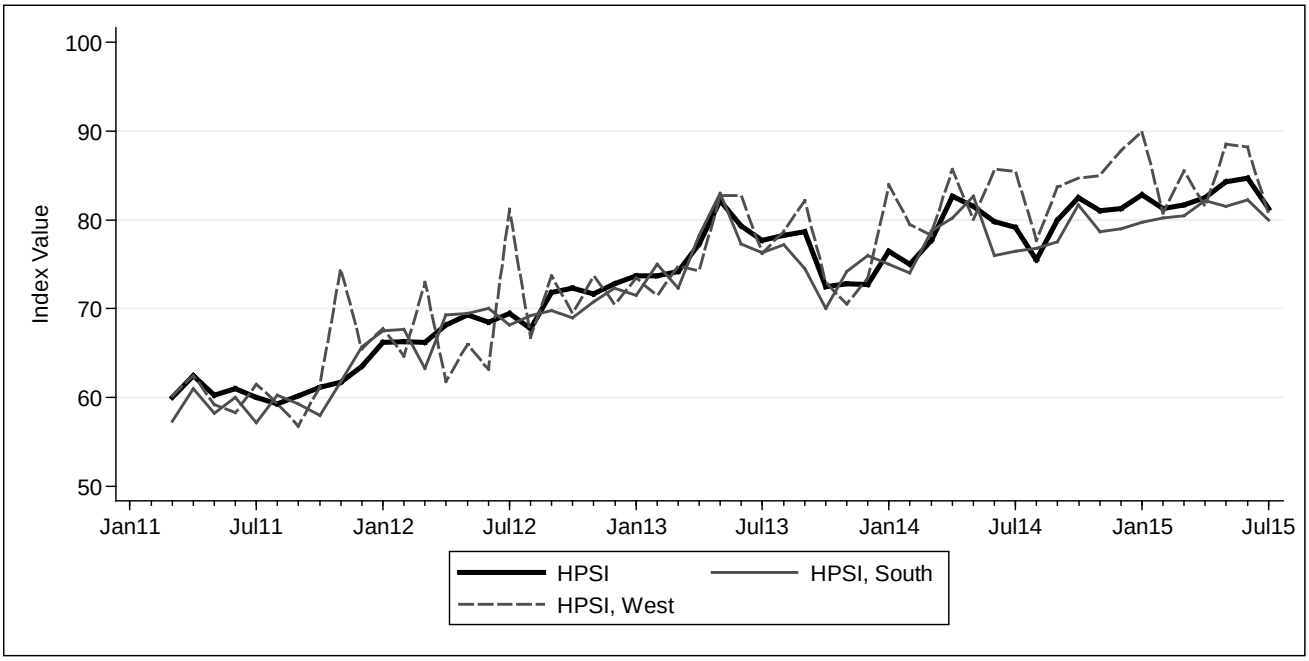


Figure IV-4: HPSI by Region

(Monthly, not seasonally adjusted, March 2011 – July 2015)

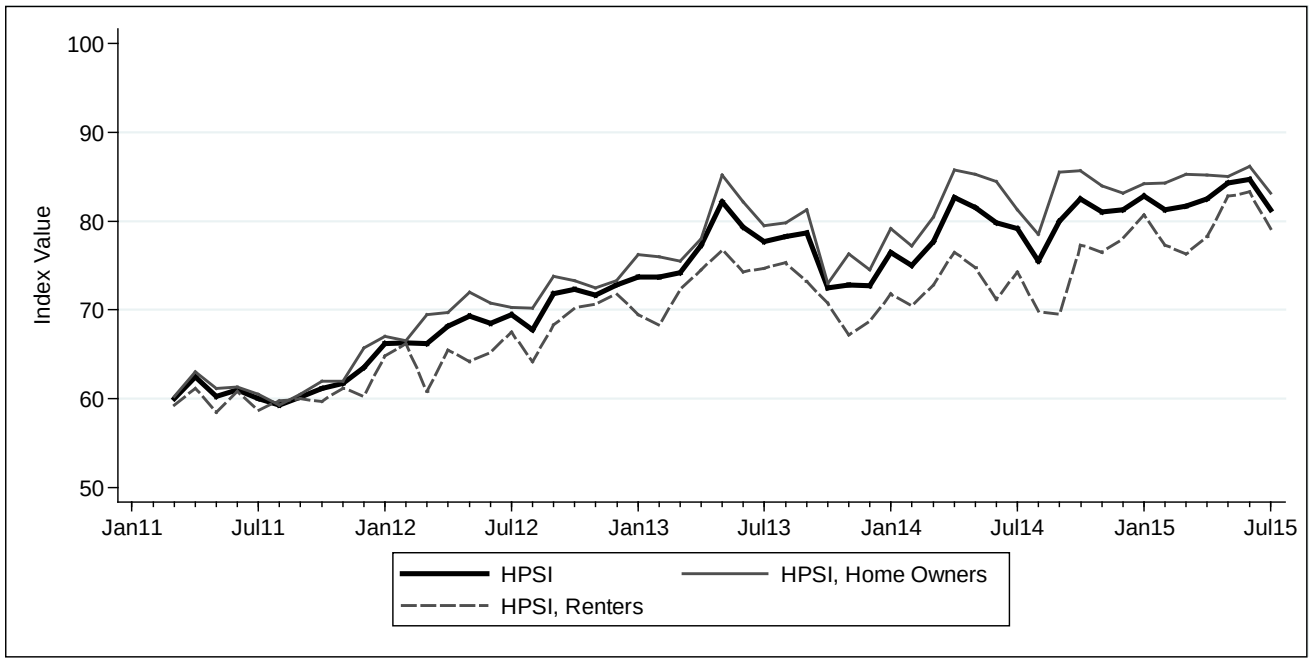


Figure IV-5: HPSI by Housing Tenure

(monthly, not seasonally adjusted, March 2011 – July 2015)

V. HPSI Performance: Forecasting Housing Market Outcomes

One objective for the HPSI is that it provides signals about future housing market outcomes. The HPSI might provide valuable signals about future outcomes either when used alone or when supplementing other information, or both.

Below we evaluate how well the monthly movements of the HPSI during 2011 – 2014 signaled future movements of four, important, national aspects of housing markets: house price growth, total home sales, single-family housing starts, and (purchase-money mortgage) originations. We show evidence for both 6-month and 12-month horizons. For the short, unusual period since the Great Recession, we also analyze whether the HPSI could have improved upon forecasts of those four housing market outcomes that were made by Fannie Mae's Economic and Strategic Research (ESR) group.

A. House Prices

Figure V-1 shows the measure of house prices that we used: FHFA's national, monthly, purchase-only, seasonally adjusted, repeat-sales, house price index (HPI). Figure V-1 shows the level of the HPI for January 2000 through July 2015. Figure V-2 shows the percentage change of that house price index over the prior 12 months for January 2000 – July 2015.

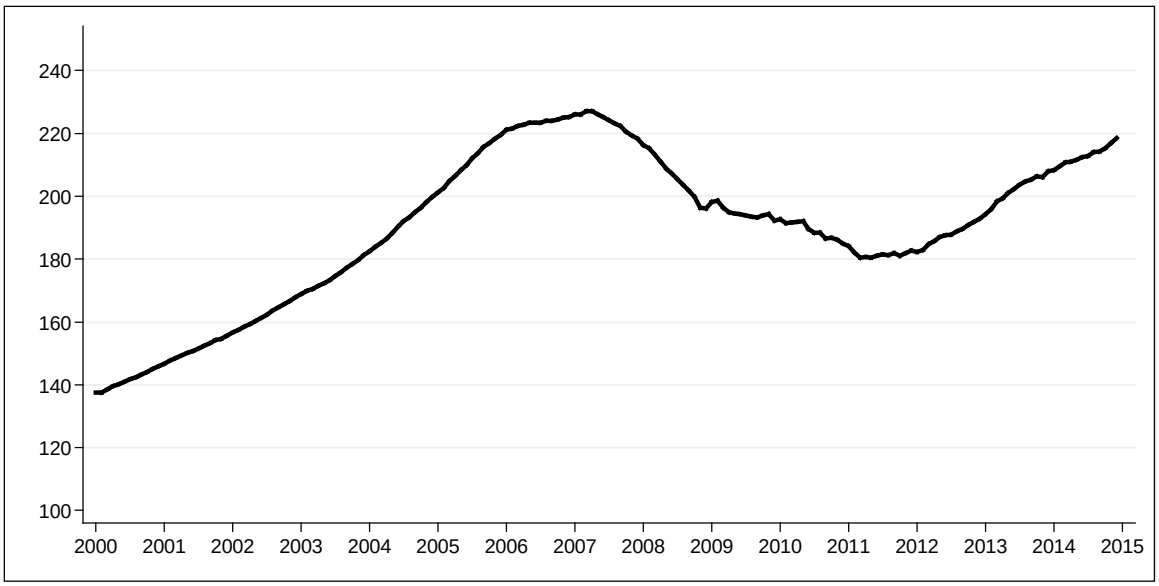


Figure V-1: FHFA House Price Index

(Monthly, seasonally adjusted, January 2000 – December 2014, January 1991 = 100, December 2014 = 218.6)

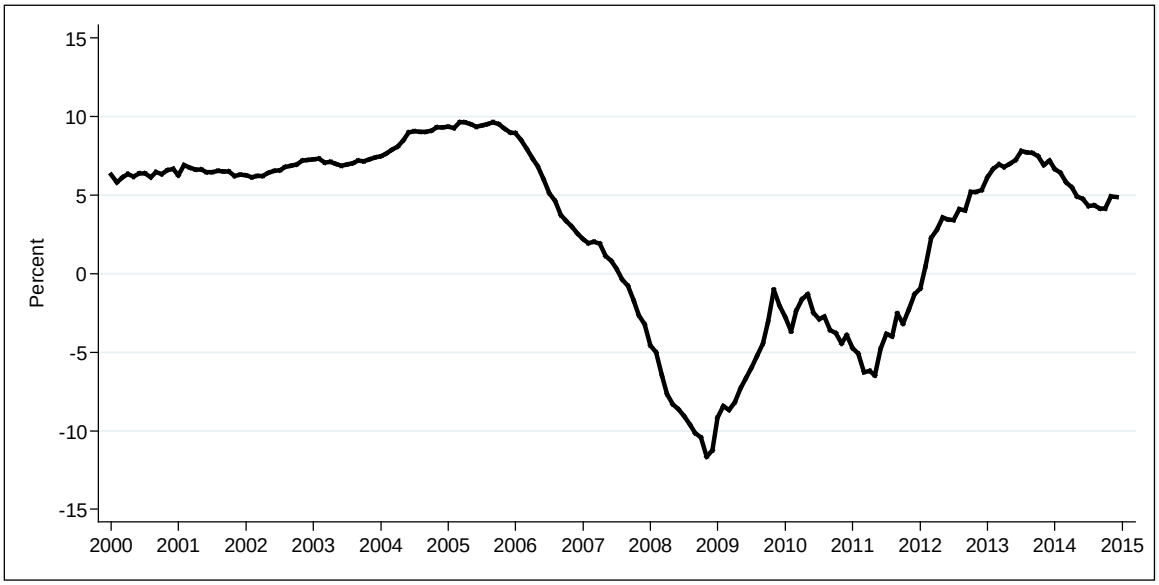


Figure V-2: Percentage Change in House Prices over the Prior 12 Months

(January 2000 – December 2014)

Figure V-3 shows 12-month-ahead growth rate of house prices (solid black line) for March 2011 – December 2013. For that period, data for both the HPSI and (actual) future house price growth are available, which enabled us to compare the future values with forecasted values of house price growth. Since December 2014 was the most recent month for which we had HPI data, December 2013 was the most recent month for which we had 12-month-ahead house price growth. Figure V-3 also shows six-month-ahead growth rates of house prices (solid gray line), which were available through June 2014. The HPSI is plotted for March 2011 - December 2014.

The 12-month-ahead growth rate of house prices peaked at 8.3 percent in July 2012, declined to 4.2 percent by October 2013, and then ticked upward near the end of 2013. The six-month-ahead growth rate of house prices peaked at 9.8 percent in January 2013, fell to 3.3 percent by March 2014, but then rose through June 2014. Figure V-3 shows that the HPSI initially fell from its base level of 60 in March 2011 and then rose rather steadily, reaching 82.5 in May 2013. The HPSI tapered off during the bond market's "taper tantrum", but then moved up, then down, and back up during 2014.

With HPI data through December 2014, we had 34 months with observations for both the HPSI and 12-month-ahead house price growth, with six more months for the 6-month-ahead growth rate of house prices. The correlations of the HPSI with the shorter-horizon and the longer-horizon house price growth rates were 0.17 and 0.33.

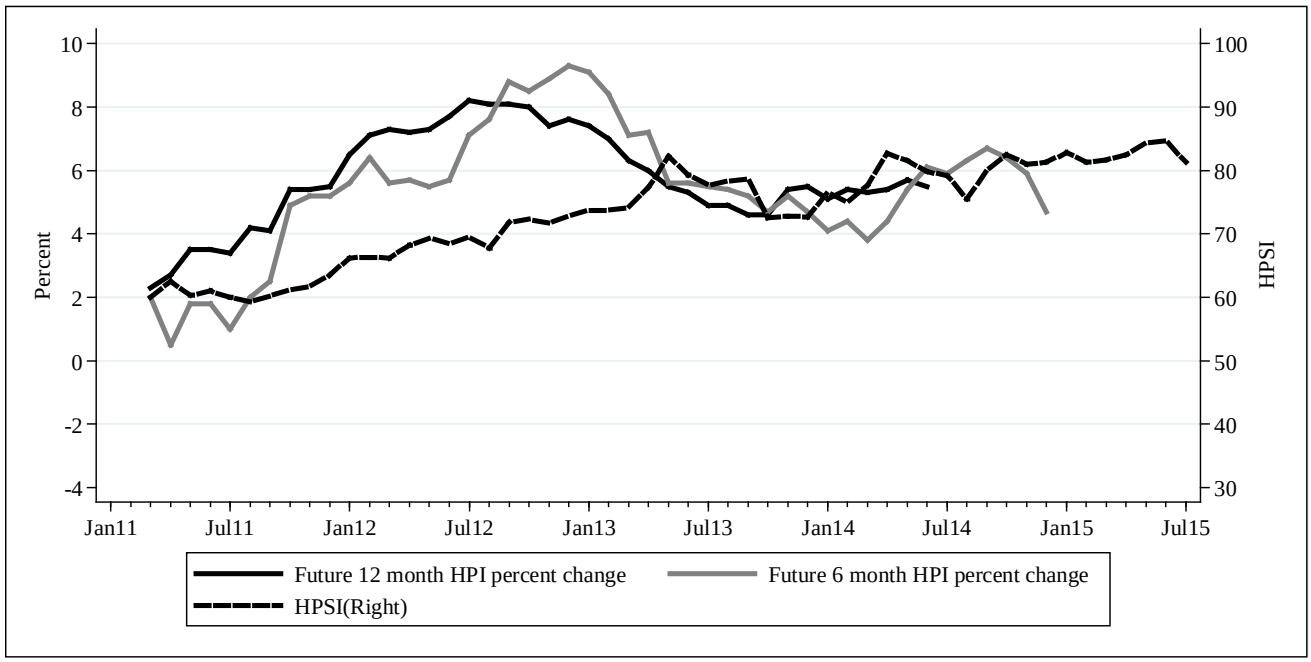


Figure V-3: Percentage Change in Future House Prices over Six- and 12-Month Horizons and the HPSI

(Monthly, March 2011 – December 2014, house prices: seasonally adjusted, annual rate, percent)

Figure V-4 lets us compare actual growth (solid black line) and two forecasts of 12-month-ahead house price growth: one ex ante, or real-time, forecast and one ex post, or in-sample, forecast. The ex ante forecast comes from the NHS: The gray, dotted line shows respondents' average, expected house price growth for the next 12 months.

The ex post forecasts are the fitted values from a regression of future house price growth on the HPSI (and a constant term). That ex post regression indicated that HPSI was positively and significantly related to future house price growth. The ex post forecasts are infeasible, in that they could not be produced until after the sample period ended and we had the regression data and estimates. The out-of-sample, post-2013 forecasts applied the regression estimates to the 2014 values of the HPSI. Analyzing ex post forecasts like these can be informative. But, when doing so, it is essential to consider the effects on those forecasts of the actual, future data and resulting regression estimates.

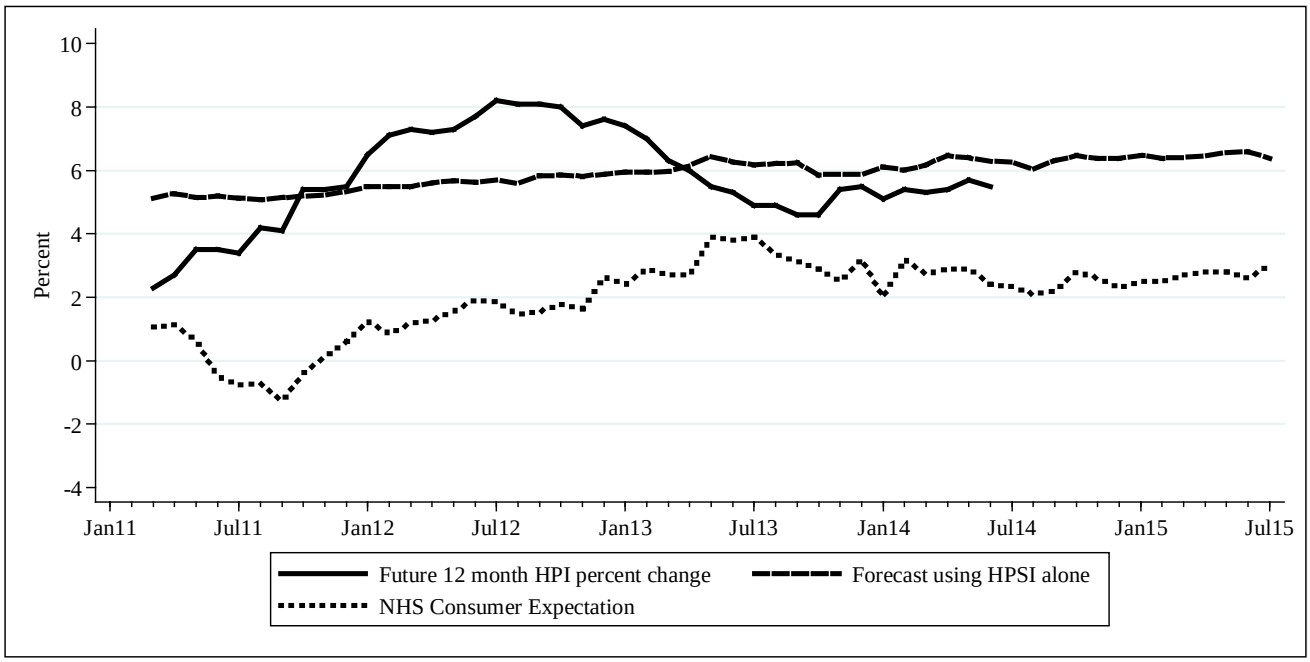


Figure V-4: Percentage Change in House Prices: 12-Month-Ahead Actual, Expected, and Forecasted

(Monthly, March 2011 – June 2014, annual rate, percent)

During 2011 – 2013, house prices subsequently grew considerably faster than NHS respondents' forecasted. For example, during the middle of 2012 NHS respondents forecasted that house prices would grow by less than two percent over the next 12 months, when they actually then rose by about seven precent. As the months passed, forecasts of house price growth rates rose and future growth rates fell. By the middle of 2013, consumers' forecasts of house price growth were more accurate, but then actual and forecasted house price growth rates diverged again, differing by about two percentage points near the end of 2013.

NHS respondents were certainly not the only forecasters who failed to anticipate that house prices would rise so rapidly. The respondents to the Michigan survey expected house price growth rates that were broadly similar to those of NHS respondents and were similarly too low. Professional forecasters also generally failed to anticipate high and rising house price growth rates in 2012 and 2013. For example, the four-quarter-ahead forecasts in the FRB Philadelphia's Survey of Professional Forecasters averaged -1.1 percent in 2011Q1 and -0.1 percent in 2012Q1.

NHS respondents' expectations for house price growth rates were much more highly correlated with recent, past growth rates (0.8) than with actual, future growth rates (0.5) during this period. Given the clear, wave-like patterns in house price growth rates historically, relying on past growth rates to form expectations of future growth rates is neither surprising nor troubling. However, analyzing whether

respondents rely too much (or too little) on past house price growth or on other information is beyond our scope for now.

Figure V-5 shows the same future and HPSI-regression-based forecast values as in Figure V-4, except that the forecast horizons were shortened from 12 to six months. (The NHS does not ask about house prices over a six-month horizon.) The shorter horizon allowed us to extend the end of the sample period by six months, from June 2014 to December 2014. As we would expect for the shorter, six-month horizon forecasts, the actual and fitted values of house price growth tended to fluctuate more than in Figure V-4. But, also as expected, the shorter horizon had general patterns of actual and forecasted values that were quite similar to those for the longer horizon.

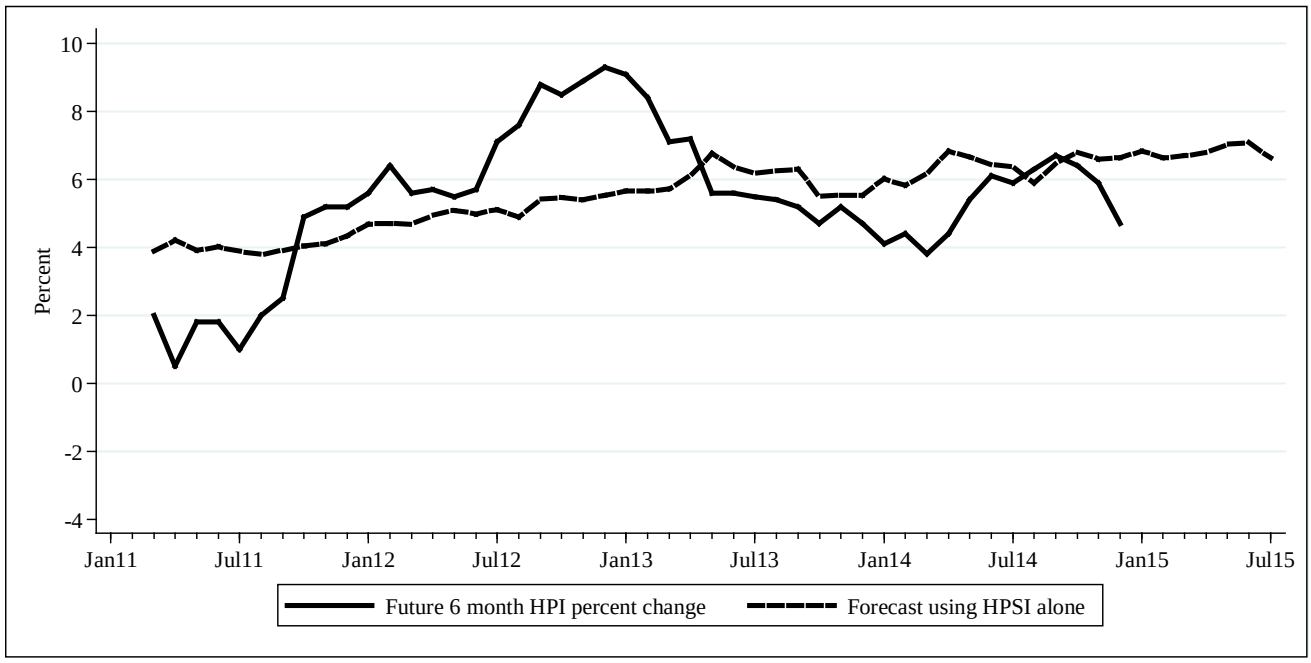


Figure V-5: Percentage Change in House Prices: Six-Month-Ahead Actual and Forecasted

(Monthly, March 2011 – December 2014, annual rate, percent)

B. Home Sales

We used the sum of existing home sales and of new home sales as our measure of (total) home sales. The National Association of Realtors (NAR) estimates existing home sales.[25] The U.S. Census Bureau uses its monthly Survey of Construction to help it estimate new home sales.[26] From NAR and Census, we obtained seasonally-adjusted, monthly data. Typically, sales of existing homes were about four times as numerous as sales of new homes. Sales of new and existing homes typically rose and fell together: The correlation between existing and new sales in monthly data for 2000 – 2014 was about 0.9.

Figure V-6 below shows home sales (in millions) since January 2000. Sales rose strongly into 2005 and then fell sharply until 2009. After short, sharp rises and falls in 2009 and 2010, home sales then fairly steadily rose, exceeding an annual rate of five million sales over the past three years. At 5.5 million in December 2014, home sales far exceeded their nadir (below 4 million) in 2010. Still, sales have been far below their rates in the years before the financial crisis and the Great Recession.

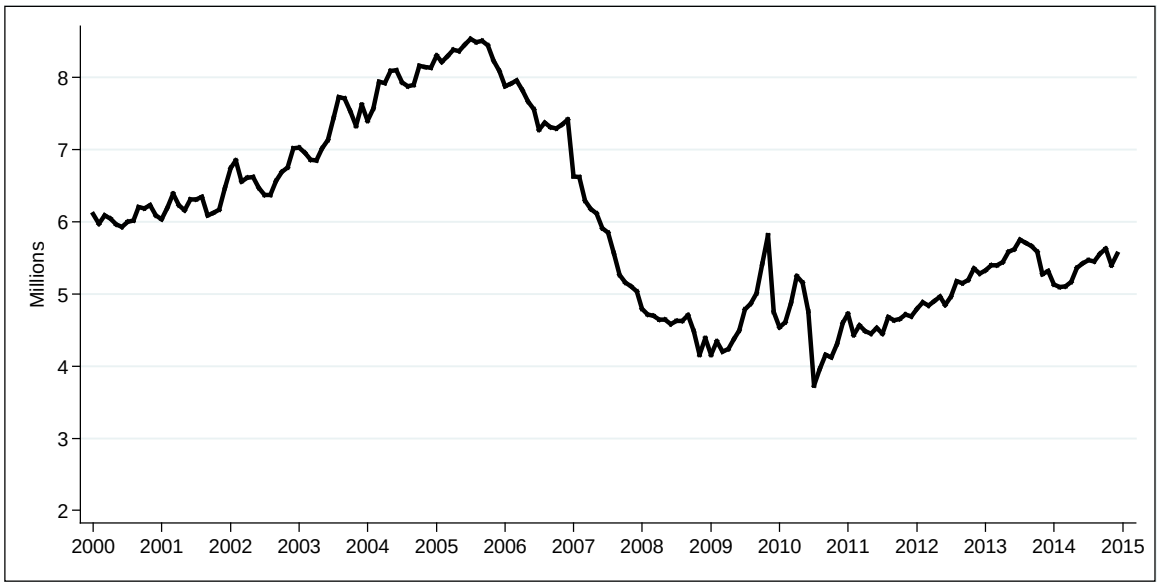


Figure V-6: Home Sales

(Monthly, January 2000 – December 2014, seasonally adjusted, annual rate, millions)

[25] NAR data for existing home sales includes sales of single-family homes, as well as sales of condos and co-ops.
[26] Census data for new home sales pertains only to single-family homes.

Starting with March 2011, Figure V-7 shows future home sales for six- and 12-month horizons and the HPSI.[27] Six- and 12-month-ahead home sales end in June 2014 and December 2013. Until about the end of 2012, both future sales series and the HPSI traced out upward-sloped, nearly-straight lines.

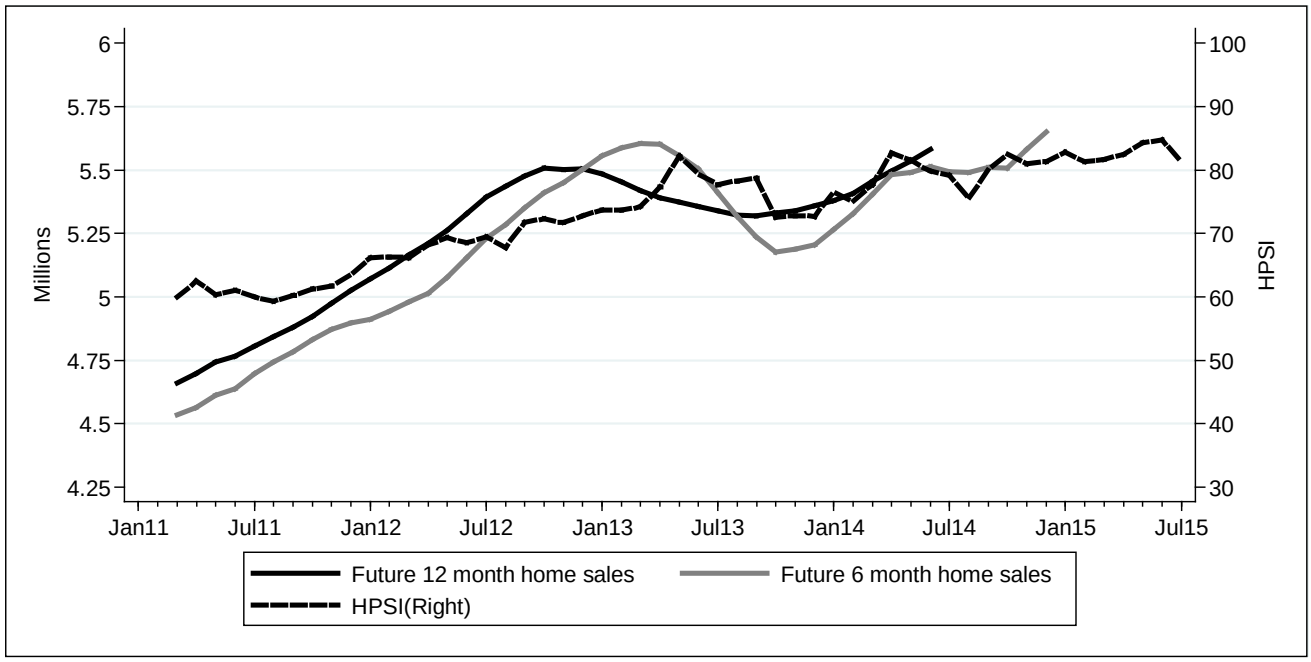


Figure V-7: Future Home Sales over Six- and 12-Month Horizons and the HPSI

(Monthly, March 2011 – December 2014, annual rate, millions)

The HPSI quite closely tracked home sales six months ahead; it did not track 12-month-ahead home sales nearly as closely. From early 2013 through the end of 2014, the HPSI ebbed and flowed within a moderate range. The dip in actual sales in the middle of 2014 produced the prior dips in the two lines for future sales. Naturally enough, the NHS respondents had not foreseen, at either 12-month or six-month horizons, the "taper tantrum" and 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 which presumably stemmed in part from international political events and from global oil markets. Nonetheless, fluctuations in future home sales six-months-ahead were tracked through mid-2014 fairly closely by fluctuations in the HPSI.

Figure V-8 shows actual values and forecasts of future home sales over a 12-month horizon from March 2010 – December 2013. The ex post, or in-sample, forecasts are the fitted values from a regression of future home sales on the HPSI (and a constant term) for the period from March 2011 –

[27] Note that the sales data in the figure above pertain to a single month, while future sales refer to monthly average of sales over the six-month or the 12-month horizon.

December 2013.Adding the lagged value of home sales to the regression changed forecasted sales so little that we do not show the results.

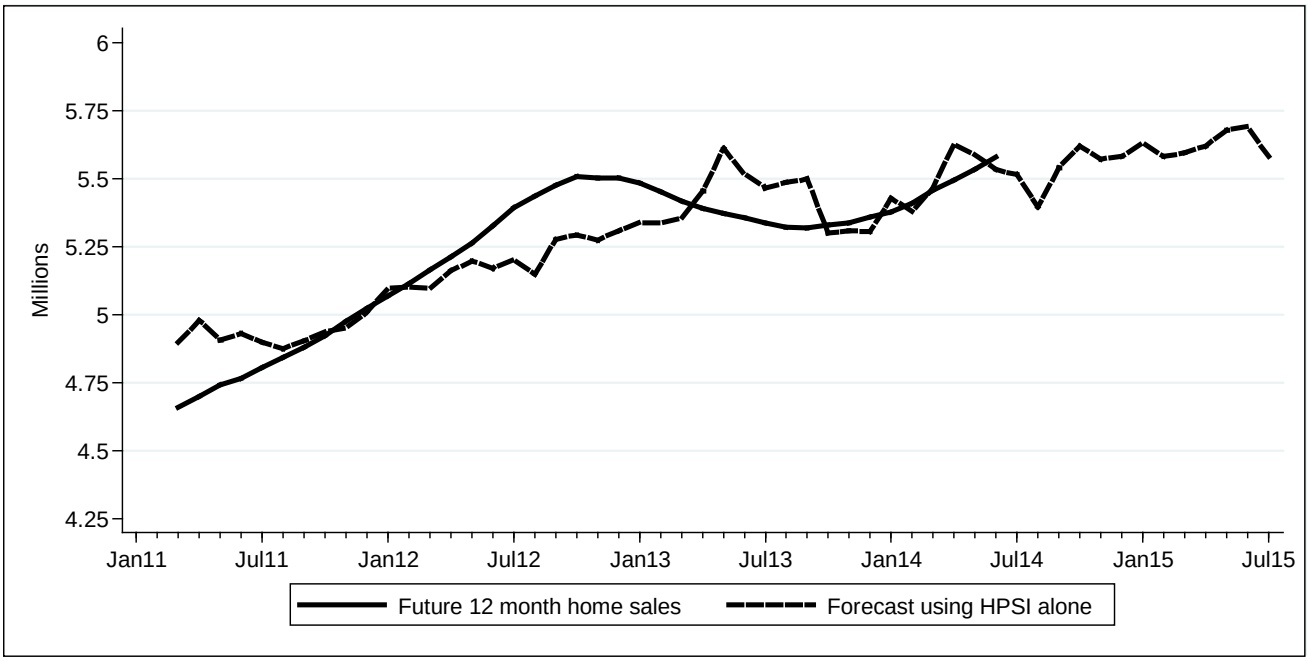


Figure V-8: Home Sales: Future and Forecasted over 12-Month Horizons

(Monthly, averaged over horizon, March 2011 – June 2014, seasonally adjusted, annual rate, millions)

Figure V-9 differs from Figure V-8 by using six-month instead of 12-month horizons. As noted above, fluctuations in the HPSI tracked future home sales better over the shorter, 6-month horizon than over the longer, 12-month horizon. Again, because adding lagged sales to the regression that included the HPSI changed the fitted values so little, we did not show those forecasts.

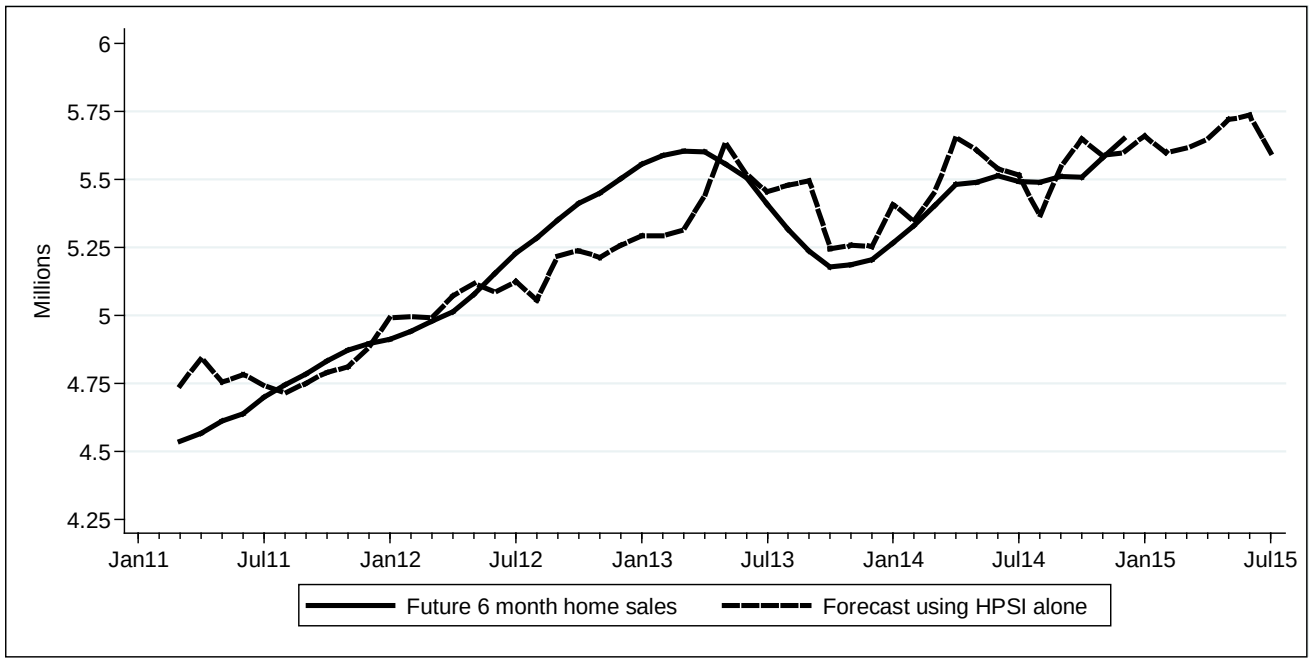


Figure V-9: Home Sales: Future and Forecasted over Six-Month Horizons

(Monthly, averaged over horizon, March 2011 – December 2014, seasonally adjusted, annual rate, millions)

C. Housing Starts

The Census Bureau estimates monthly, seasonally-adjusted, single-family housing starts. Figure V-10 below plots housing starts for January 2000 – December 2014. Starts rose strongly and steadily through the end of 2005. Then, even more dramatically than sales, housing starts plummeted until 2009. Although starts trended upward after 2008, the trend has been so mild by historical standards that single-family housing starts still had not reached half the pace that occurred in the middle of the 2000s.

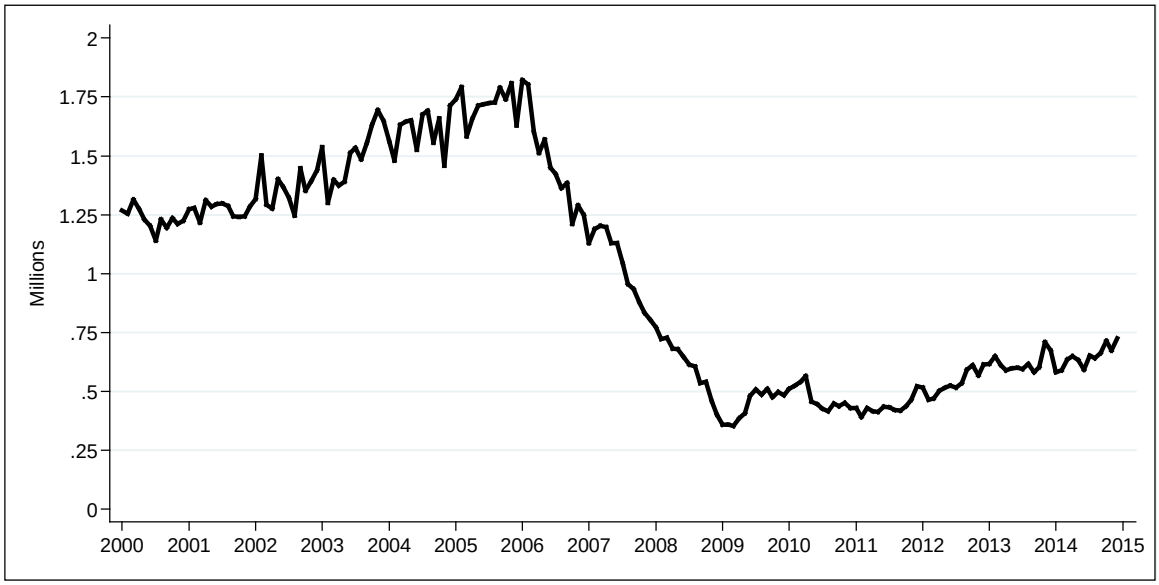


Figure V-10: Housing Starts

(Monthly, January 2000 – December 2014, seasonally adjusted, annual rate, millions)

Beginning with March 2011, Figure V-11 shows housing starts six and 12 months ahead and the HPSI.[28] With actual data through December 2014, we had data for six- and 12-month-ahead housing starts through June 2014 and December 2013. Although perhaps less than other housing outcomes, future housing starts and the HPSI both trended upward from early 2011 through the end of 2012 and were strongly correlated.

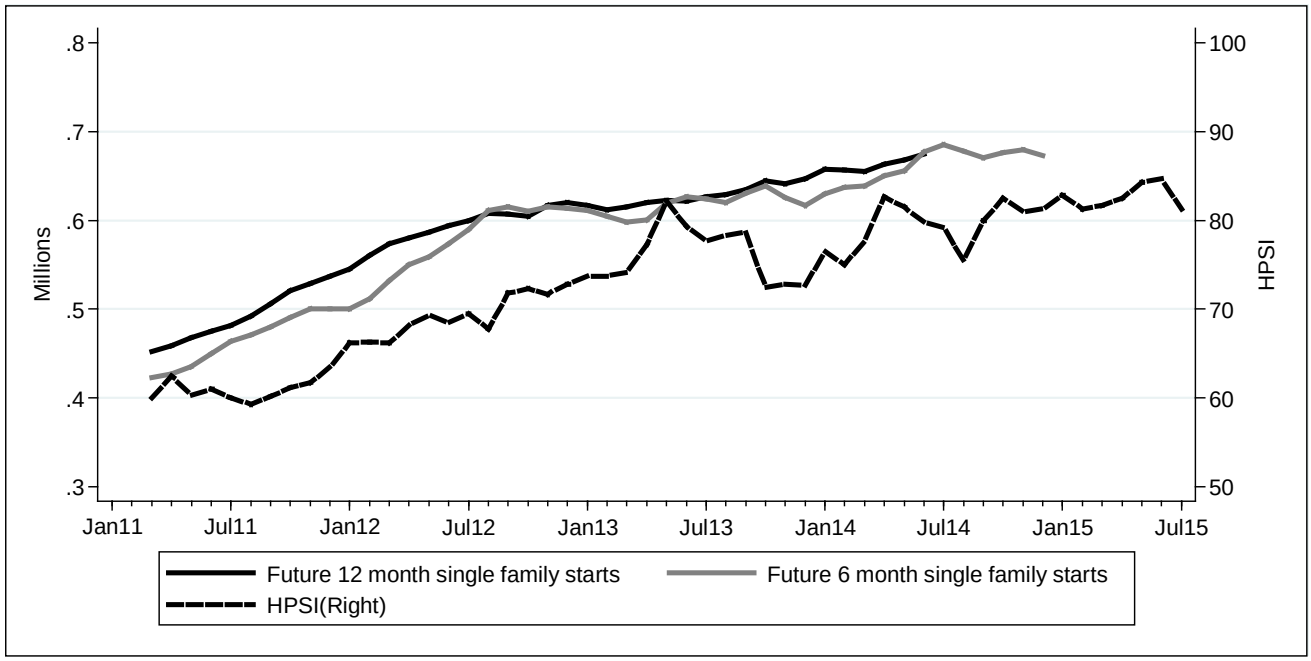


Figure V-11: Future Housing Starts over Six- and 12-Month Horizons and the HPSI

(Monthly, averaged over horizon, March 2011 - December 2014, seasonally adjusted, annual rate, millions)

The lull in housing starts in the middle of 2013 of course is reflected in the prior dips in the measures of future housing starts for the six-month-ahead and the 12-month-ahead horizons. But, there are no obvious corresponding dips in the HPSI near the times that the future series dipped. And, it is neither surprising nor distressing that NHS respondents had not foreseen in 2012, for either the 12-month or the six-month horizon, the rise in mortgage rates that came in the Spring of 2013 or the declines in mortgage rates during 2014. Nor were the short-term increases and the short-term decreases in HPSI during 2013 clearly followed by similar patterns in starts for either the six- or the 12-month-ahead horizon. Perhaps unsurprisingly, recent experience points to short-term fluctuations in HPSI better predicting fluctuations in home sales than in housing starts. Although there were not obvious short-term links, the longer-term movements so far in the HPSI tracked future housing starts (both at the six- and 12-month horizons) fairly closely.

[28] Note that the housing starts data in the figure above pertain to a single month, while future housing starts refer to monthly average of housing starts over the six-month or the 12-month horizon.

Figure V-12 shows actual values (solid line) and ex post forecasts (dashed line) of future (single-family) housing starts over a 12-month horizon from March 2010 – December 2013. The ex post, or in-sample, forecasts are the fitted values from a regression of future housing starts on the HPSI (and a constant term) for the period from March 2011 – December 2013.Adding the lagged value of housing starts to the regression changed forecasted starts so little that we do not show the results.

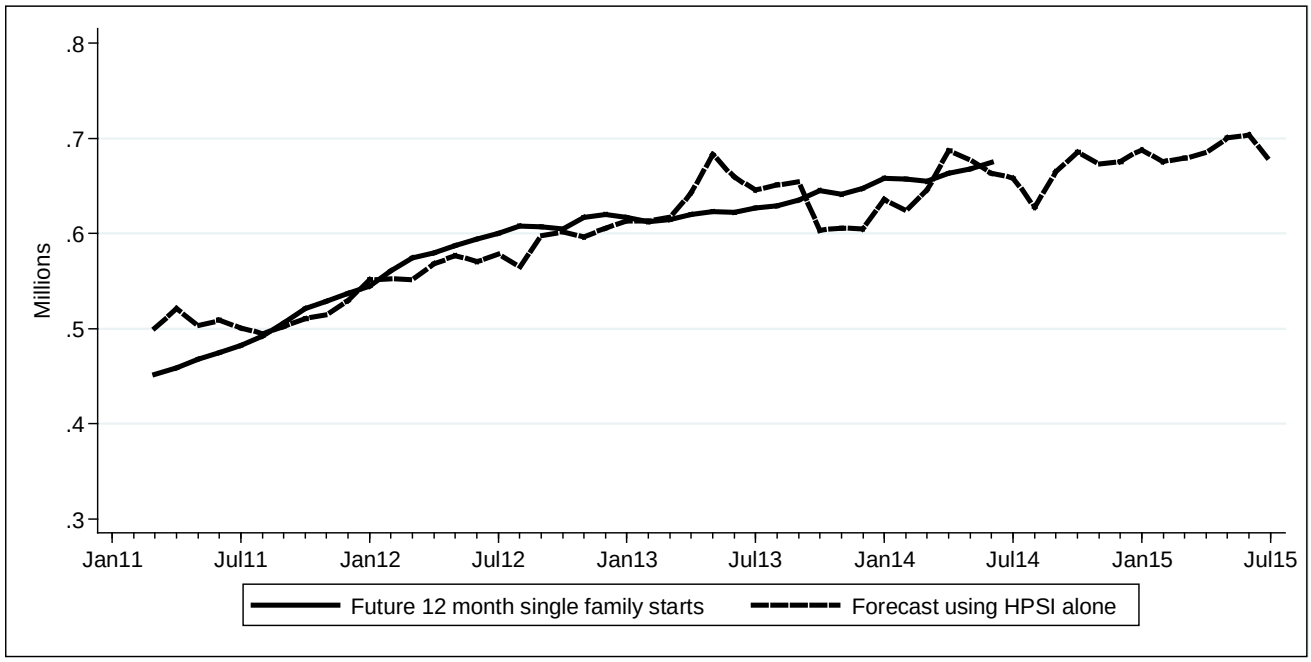


Figure V-12: Housing Starts: Future and Forecasted over 12-Month Horizons

(Monthly, averaged over horizon, March 2011 - June 2014, seasonally adjusted, annual rate, millions)

Figure V-13 mimics Figure V-12 but uses six-month horizons instead of 12-month horizons. Above, we had shown that HPSI foreshadowed home sales more clearly over the shorter, six-month horizon than over the longer, 12-month horizon. In constrast, the HPSI appears to track fluctuations in future housing starts about equally well for the six- and the 12-month horizons.

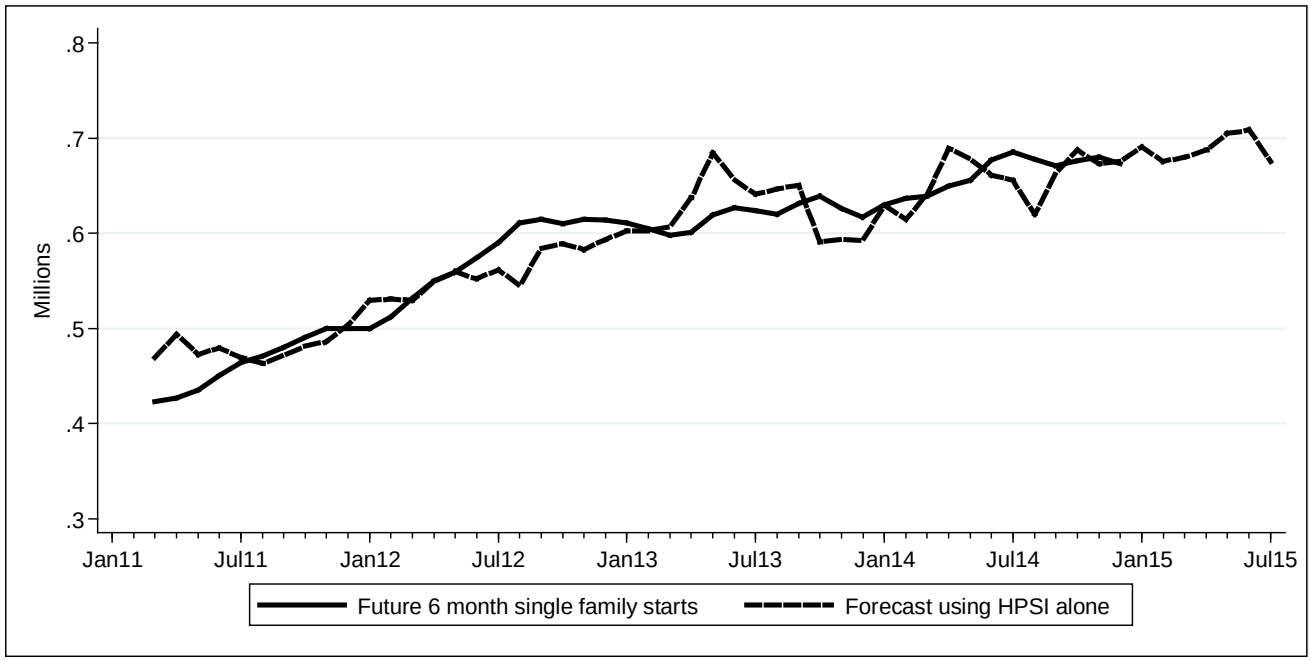


Figure V-13: Housing Starts: Future and Forecasted over Six-Month Horizons

(Monthly, averaged over horizon, March 2011 - December 2014, seasonally adjusted, annual rate, millions)

D. Originations

Figure V-14 shows the quarterly flow (in billions of dollars) of (purchase-money-mortgage) originations for 1 to 4 family homes. We show and analyzed the originations data that were estimated by the Mortgage Bankers Association (MBA) for 2000Q1 - 2014Q4 after we seasonally adjusted them.[29]

Originations grew rapidly during the housing and mortgage boom and bubble of the early- to mid-2000s, nearly doubling from 2000 to 2006. The rising tide of originations was followed by a protracted decline from 2006 through 2010 that lowered them by about two thirds. During and after the financial crisis, origination flows were more volatile and likely less predictable. The volatility and unpredictability of originations likely resulted, at least in part, from the financial and housing crises, public-policy responses to the crises, and the large declines in mortgage interest rates. After 2010, originations rose noticeably, but even at the end of 2014 were still far below their pace in 2000.

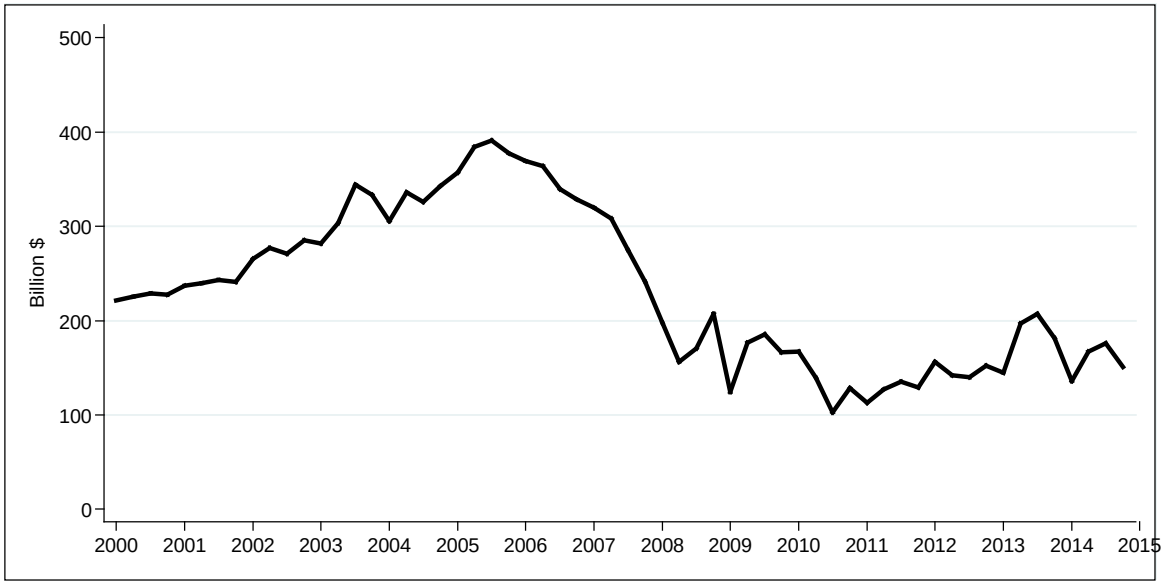


Figure V-14: Originations

(Quarterly, 2000Q1 – 2014Q4, purchase-money mortgages, SAAR, $billions, source: MBA)

[29] We used a seasonal adjustment routine in STATA. See Wang, Qunyong, and Na Wu. "Menu-driven X-12-ARIMA seasonal adjustment in Stata." *Stata Journal* 12.2 (2012): 214. http://www.stata-journal.com/article.html?article=st0255.

Figure V-15 shows the HPSI and future originations, which are the averages of originations averaged over upcoming six- and 12-month horizons.[30] For 2010-2014, we started with quarterly, not-seasonally-adjusted originations data that were estimated by Fannie Mae's ESR group[31]. To construct monthly data, we used the quarterly observation for each mid-quarter month. Next, we linearly interpolated between those months to get monthly data. Then, because we had only a few years of monthly data, we seasonally adjusted those monthly data with the seasonal factors that were implied by data for home sales. With actual originations data through the end of 2014, our data for six- and 12-month-ahead originations ended in June 2014 and December 2013.

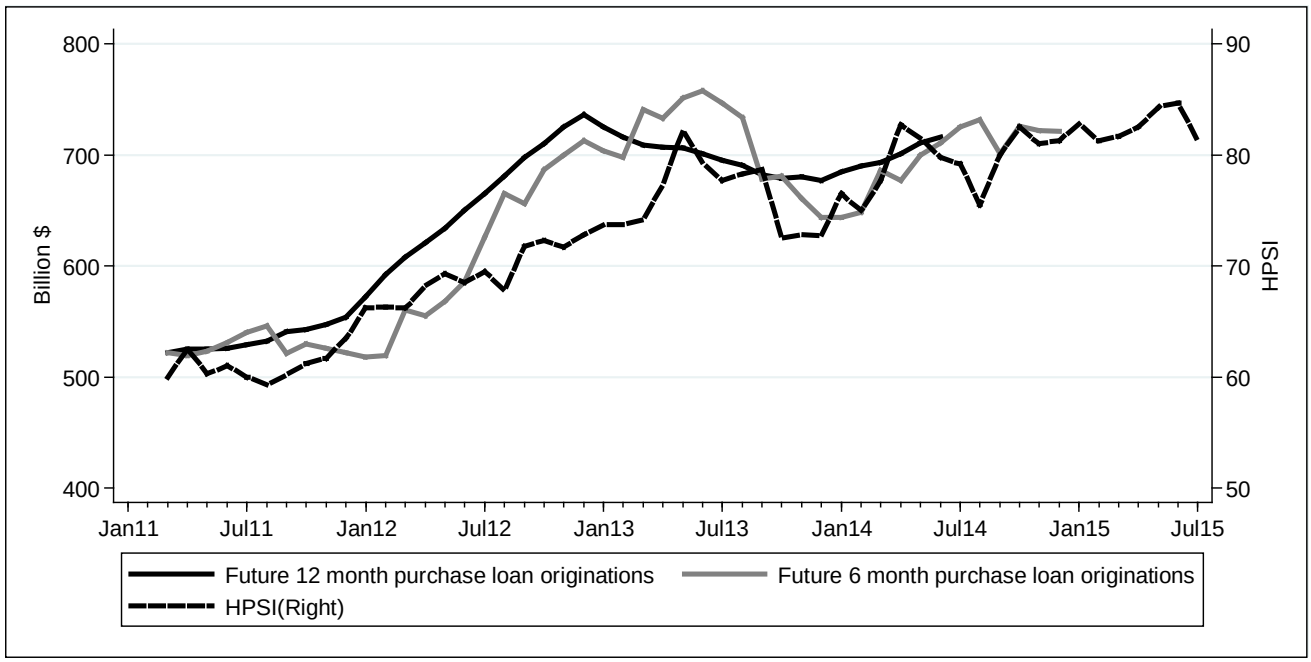


Figure V-15: Future Originations over Six- and 12-Month Horizons and the HPSI

(Monthly, averaged over horizon, March 2011 - December 2014, seasonally adjusted, annual rate, $billions)

Over this period, the three series have followed similar paths, with HPSI having correlation coefficients of about 0.9 with both six-month-ahead and the 12-month-ahead originations. For instance, until 2013, the paths of future originations and the HPSI all traced out upward-sloped, nearly straight lines. During mid-2013 to mid-2014, declines and increases in HPSI and the six-month-ahead future originations largely tracked one another. The figure also highlights some of the potential advantages or disadvantages of computing moving averages with different horizons (e.g., six- vs. 12-months). For instance, HPSI captures quite well the turning point in future originations six-months-

[30] Note that, similarly to earlier sections, originations in the figure above pertain to a single quarter, while future originations refer to monthly averages over six and 12-month horizons.
[31] Fannie Mae Economic & Housing Outlook http://www.fanniemae.com/portal/research-and-analysis/emma.html

ahead (with both series peaking in mid-2013), but HPSI does not quite serve as a leading indicator for originations twelve-months-ahead (which peaked earlier in late 2012).

Figure V-16 shows actual values (solid line) and ex post forecasts (dashed line) of future (single-family) originations over a 12-month horizon from March 2010 – December 2013. The ex post, or in-sample, forecasts are the fitted values from a regression of future originations on the HPSI (and a constant term) for the period from March 2011 – December 2013.Adding the lagged value of originations to the regression changed forecasted originations so little that we do not show the results.

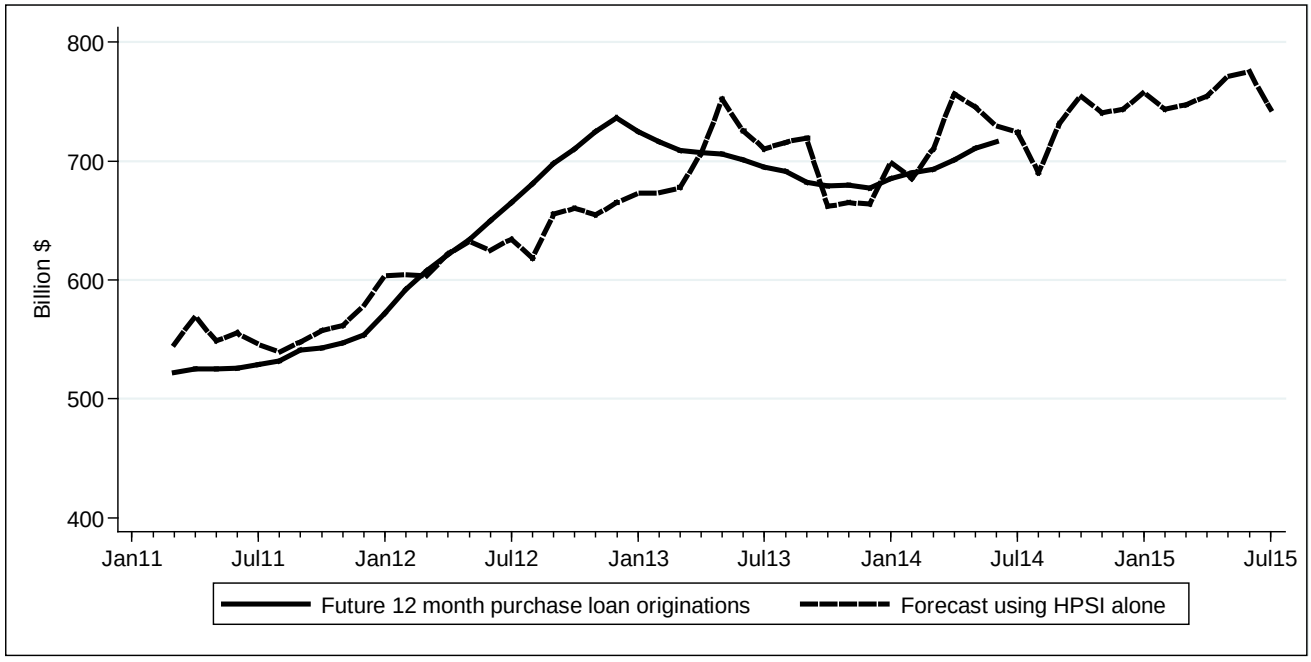


Figure V-16: Originations: Future and Forecasted over 12-Month Horizons

(Monthly, March 2011 – June 2014, SAAR, purchase-money mortgages, $billions)

Figure V-17 mimics Figure V-16, but uses six-month horizons instead of 12-month horizons. Like sales but unlike starts, future originations were more closely tracked by the HPSI for the six-month horizon than for the longer, 12-month horizon.

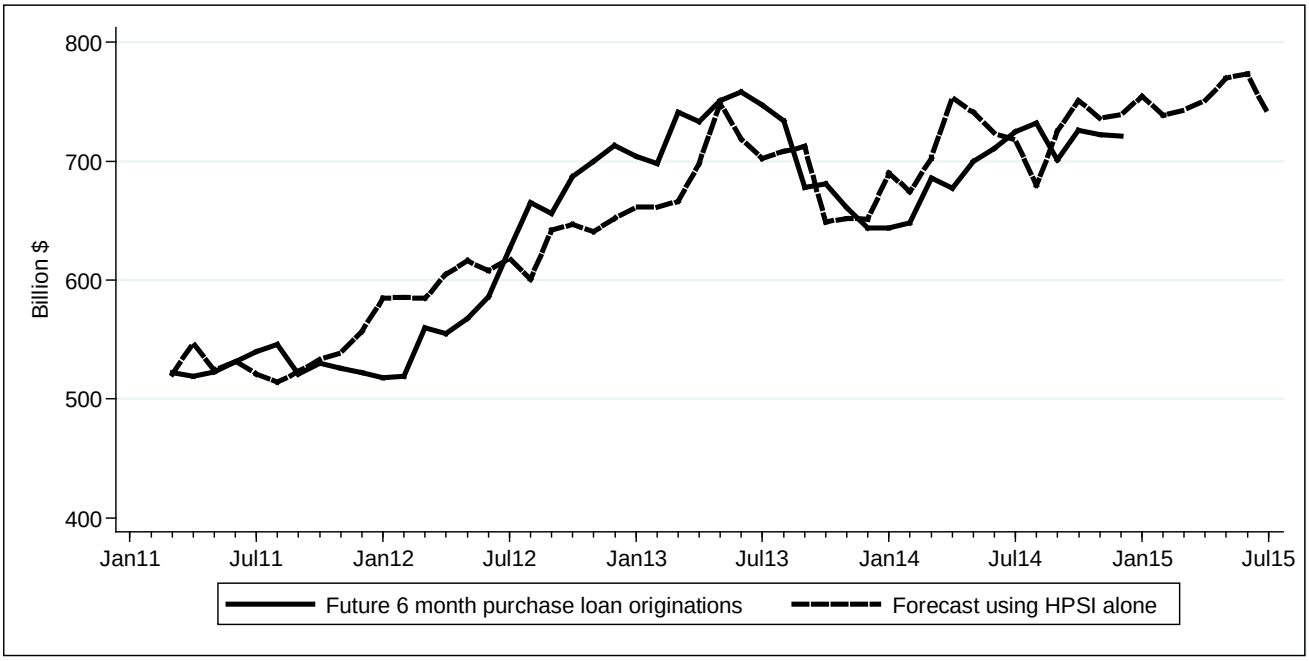


Figure V-17: Originations: Future and Forecasted over Six-Month Horizons

(March 2011 – December 2014, SAAR, purchase-money mortgages, $Billions)

Table V-1 and Table V-2 show the ex post, or in-sample, forecast regressions that we described in sections V-A - Section V-D. The tables show that the HPSI was importantly related to future outcomes for both the six-month-ahead and the 12-month-ahead horizons. For both horizons, the t-statistics and thus the R-squared statistics were very significant for sales, starts, and originations. Notable, however, is the weaker relation in this period of the HPSI to future house prices. We detected no statistically significant relation at the 12-month-ahead horizon, though the six-month-ahead relation was statistically significant (t=2.43).

Table V-1

Regressions of 12-Month-Ahead Housing market outcomes on the HPSI

(Monthly, March 2011 – June 2014)

	Explanatory Variables	House Prices	Home Sales	Housing Starts	Originations
		(1)	(2)	(3)	(4)
1.	HPSI	0.0593*	0.0322***	0.00822***	9.274***
		(1.74)	(10.04)	(13.47)	(12.28)
2.	Constant	1.56	2.969***	0.00734	-10.36
		(0.65)	(13.05)	(0.169)	(-0.193)
	Observations	40	40	40	40
	R-squared	0.074	0.726	0.827	0.799

t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels.

Table V-2

Regressions of 6-Month-Ahead Housing market outcomes on the HPSI

(Monthly, March 2011 – December 2014)

	Explanatory Variables	House Prices	Home Sales	Housing Starts	Originations
		(1)	(2)	(3)	(4)
1.	HPSI	0.1296***	0.0403***	0.00968***	10.22***
		(3.36)	(13.86)	(16.17)	(13.30)
2.	Constant	-3.89	2.328***	-0.111**	-92.22
		(-1.40)	(11.10)	(-2.563)	(-1.661)
	Observations	46	46	46	46
	R-squared	0.205	0.814	0.856	0.801

t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels.

Table V-3 shows the correlation coefficients between the HPSI and the four, future housing market outcomes. Sales, starts, and originations were highly correlated with each other during this period: Each correlation was at least 0.94. Each of the three future outcomes was also highly correlated with the HPSI: Each correlation was at least 0.84. In contrast, the growth rate of house prices was much less correlated with both the other outcomes and with the HPSI.

Table V-3

Correlation Coefficients between the HPSI and 12-Month-Ahead Housing Market Outcomes

(Monthly, March 2011 – June 2014)

	HPSI	House Prices	Home Sales	Housing Starts	Originations
HPSI	1.00				
House Prices	0.27	1.00			
Home Sales	0.85	0.67	1.00		
Housing Starts	0.91	0.48	0.95	1.00	
Originations	0.89	0.55	0.97	0.93	1.00

E. Could HPSI Help Forecasts?

1. Average forecasts and forecast errors

Here we analyze whether the HPSI could have improved forecasts of housing markets during 2011 – 2015. To begin, we calculated the averages of housing market forecasts that were made in real time by a number of large organizations that had long focused on and forecasted housing markets. Not all of these organizations explicitly forecasted all of our housing market outcomes. Thus, the averages of the forecasts differed by outcome in the number of organizations' whose forecasts were used to calculate the averages. When organizations provided data to us for their past forecasts, we agreed to not disclose any individual organization's forecasts. For each of our four outcomes, we had forecasts made by enough organizations that knowing any one organization's forecasts alone and the averages would not provide enough information to deduce other organizations' forecasts.

We then examined the deviations of actual, future from average forecasts made each month for housing market outcomes. We analyzed whether recent changes in the HPSI would have provided reliable signals about housing beyond those in the forecasts.

We used the forecasts that the organizations made each month from July 2011 through June 2014. Each month the organizations forecasted housing market outcomes for each of several, often eight, quarters ahead. Since we used a one-month lag of the change over the prior three months of the HPSI, the comparison period started in July 2011. Having actual data through June 2015 meant that the comparison period for our assessment of year-ahead forecast errors ended in June 2014. That left us with 12 observations of quarterly-average data. We opted instead to use 36 monthly observations.

Each month forecasts were made for several future quarters. From month to month, even within quarters, it was typical that the forecasts for a fixed 4-quarter span, say for 2013Q2-2014Q1, changed. Naturally, as news arrived through time, organizations often changed the forecasts that they made each month within a quarter, say from January to February to March 2013, for the four quarters after that quarter, e.g., 2013Q2 – 2014Q1.

The actual outcomes for that span, of course, did not change. We generated the error in a given month's forecast of an outcome by subtracting the forecast from the actual, future outcome over a 12-month (or 4-quarter or 1-year) span. Thus, from month to month within a quarter, forecasts, and thus forecast errors, typically did change.

For each month, we used the forecasts and the actual values of an outcome over the four quarters that began with the next full calendar quarter. For example, for organization A, we calculated its forecast as of February 2013 for home sales during the ensuing, 12-month-ahead interval as A's (annualized) forecast for home sales during the four quarters from 2013Q2 (the quarter that began after February) through 2014Q1. Thus, forecasts made during the last month of a quarter, say March, pertained to "12-month-ahead" intervals that ensued in less than a month, while the first-month, say January, forecasts pertained to the same span, a span that started more than two months after the forecast was made. As a

consequence, we would expect that errors in later forecasts would tend to be smaller than errors in forecasts made earlier in the same calendar quarter.

There are several concepts for many housing market outcomes. We wanted our forecast averages to match as closely as possible the concepts used to produce the data for actual outcomes. Individual organizations choose which of the several possible and reasonable concepts that they forecast for each outcome. We tried to use the forecasts, with occasional adjustments, that matched as closely as possible the concepts used by the other organizations and for which we had data. Therefore, we used the FHFA house price index for all transactions to calculate house price growth. Our measure of home sales was the sum of new, single-family homes and total (including condos and coops) existing home sales. We used starts of single-family houses. As we did above, we used originations of purchase-money mortgages for 1-4 family homes.

Table V-4 shows summary statistics for the average, 12-month-ahead errors in the monthly forecasts made during July 2011 – June 2014 for our four housing market outcomes. In general, house prices and PMM originations were stronger, but sales and starts were weaker than was forecasted. For example, house prices grew an average of 1.8 percent faster each month than the average of house price growth forecasts.

Table V-4

Summary Statistics for 12-Month-Ahead Average Forecast Errors for Housing Market Outcomes

(Average forecast error = future actual values minus average forecast, July 2011 – June 2014)

Housing Market Outcome	Obs.	Mean	Std. Dev.	Min.	Max.
House Price Growth (%)	36	1.8	1.3	-0.04	4.3
Home Sales (Thousands)	36	-143.4	284.6	-776.0	272.0
Housing Starts (Thousands)	36	-42.3	83.7	-189.0	70.0
Originations ($ Billions)	36	38.0	115.4	-151.0	178.0

2. Forecast errors and recent changes in the HPSI

The HPSI can be calculated very near the end of each month. Thus, forecasts that were being formulated, say in early March, could rely on the February of the HPSI. To allow for this time sequence and to smooth out very-short-term movements of the HPSI, we used the one-month lag of the change in the HPSI over the prior three months. For example, the forecast error for March 2013 was calculated as the actual outcome during 2013Q2 – 2014Q1 minus the forecast made during March. The

March forecast error was regressed on the recent change in the HPSI, which we calculated as the HPSI value for February 2013 minus its value for November 2012.[32]

To analyze whether signals from the HPSI could have improved forecasts, we regressed the forecast errors for each outcome on recent changes in the HPSI. Table V-5 shows the results for each of the four housing market outcomes. For each of the four outcomes, row 1 shows that the estimated relation was positive. For sales in particular and for house prices less so, the relation was statistically significant. The positive estimated coefficients in row 1 imply that actual, future outcomes were stronger than forecasted when the HPSI had risen over recent months.[33] The results in columns 1 and 4, then, suggest that forecasts would have been more accurate during this period if they had been raised (lowered) by amounts equal to recent strengthening (weakening) of the HPSI multiplied by the estimated coefficients in row 1 of Table V-5.

Table V-5

Regressions of 12-Month-Ahead Forecast Errors on Recent Changes in the HPSI

(Errors=actual minus forecast averages, lagged three-month change in HPSI, monthly, July 2011 – June 2014)

	Explanatory Variable	House Price Growth	Home Sales	Housing Starts	Originations
		(1)	(2)	(3)	(4)
1.	HPSI (lag of three-month change)	0.12*	33.7**	1.89	8.4
		(1.89)	(2.51)	(0.44)	(1.46)
2.	Constant	1.65***	-198.6***	-45.4***	24.2
		(7.32)	(-4.02)	(-2.88)	(1.15)
	Observations	36	36	36	36
	R-squared (%)	10	16	1	6

Note: t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels.

[32] In general, we found that forecast errors were more highly correlated with recent changes in the HPSI that were smoothed over three months than when we used the month-to-month change in the HPSI. Forecast errors also tended to be more highly correlated with recent changes in the HPSI than with recent changes in the Michigan-based analog to HPSI, MHPSI, which we discuss at some length below.

33 Note that the one-month lag of the three-month change equals the sum of the three-most-recent, month-to-month changes up to the prior month.

Next, Figure V-18 shows the data for average forecast errors for the percentage growth rate of house prices and for recent changes in the HPSI for July 2011 – June 2014 that were used to obtain the results in Table V-5. We chose to show house prices below because of their widespread attention, interest, and importance and because column 1 in Table V-5 implies that the correlation of house price growth forecasting errors with recent changes in the HPSI was close to the average correlation in Table V-5. On the other hand, the growth rates of house prices were atypical in that they exceeded their average forecast for all but the first month of our 36-month sample period.

Figure V-18 shows that the recent change in the HPSI was positive from November 2011 – August 2013, with the exception of September 2012 and again after January 2014. Thus, the strengthening HPSI during this period could have signaled that forecasts of house price growth were too low and should have been raised. In the case of house prices, how much, and even whether, to adjust forecasts should take into account that the estimated relation of house prices to the HPSI was relatively modest (0.12, as shown in row 1 above) and was not statistically significant. Nonetheless, Figure V-18 supports the view that even simple signals from the HPSI may improve forecasts.

Figure V-18: Average Forecast Error for House Price Growth and Recent Changes in the HPSI

(Percent, SAAR, monthly, July 2011 – June 2014)

3. Current caveats and growing confidence

At least two caveats deserve mention. First, suppose that a judgment was made that the HPSI could add to the other information that was incorporated into forecasts. Above, its positive estimated coefficient suggests, sensibly enough, that recent increases in the HPSI should signal that housing

markets will be surprisingly strong and therefore that forecasts should be upped. Once results of the sort shown in Table V-5 were available, the estimated HPSI coefficients could be used to calculate how much they suggested to adjust forecasts.

Until enough data accumulated to allow analysis and estimation of relations between forecast errors and the HPSI like those in Table V-5 above, however, it would be difficult to calculate how much forecasts should be raised following increases in the HPSI. While the direction of forecast adjustments might reasonably be surmised, the amounts would not be easily reckoned. And, absent data that are plentiful and informative enough, nor would it be easy to reckon whether the actual, as opposed to the estimated, relation was positive, and thus whether any adjustments at all were warranted.

Thus, even if we had the HPSI in hand a few years ago, considerable time needed to pass to provide enough relevant experience and data to get initial estimates. More data are now available. Prudence argues for care still when using these initial estimates because housing markets have been anything but typical in recent years. Observing the relations of the HPSI to housing market outcomes when interest rates are rising and are higher or when housing has healed more completely or turned down may well solidify the roles for the HPSI in forecasting housing market outcomes.

Second, because of "look-ahead bias," the results here are biased in favor of finding that HPSI could have helped forecasts: We evaluated which variables to include in the HPSI by using the data for the entire 2011 – 2014 period. As noted above, we also used data from that period to estimate the relation of forecast errors to recent changes in the HPSI. That meant that we made choices in light of data for housing-market outcomes that occurred after, sometimes long after, the real-time forecasts were made. Real-time forecasts could not, of course, have taken into account any of the actual future outcomes or the future values of any of the factors that drove outcomes. It is difficult to judge how much that bias influenced these regression results. It might well be that such bias would be more important during periods of substantial shocks and structural shifts. Housing and mortgage policies and markets since the financial crisis were likely locales for large shocks and shifts.

4. Forecast errors and recent directions of the HPSI

Another way to assess whether the HPSI could improve forecasts stems from calculating how often recent changes in the HPSI were followed by forecast errors of the same sign and how often of the opposite sign. Rather than quantifying the sizes of forecast errors and of recent changes in the HPSI, we can tabulate the numbers of forecast errors with positive and with negative signs and the numbers of recent changes in the HPSI that were positive and were negative. Those counts disregard whether forecast errors or recent HPSI changes were large or small. The implications of these sign counts turned out to be broadly similar to those that flowed from our regression results. Caveats similar to those noted for our regression results apply to the results of our sign counts.

For each of our four housing market outcomes, Table V-6 shows cross-tabulations of the numbers of months (out of a total of 36 months) for which forecast errors and recent changes in the HPSI were positive and were negative. For house price growth, the first row shows that, for 26 of the 27 months

that the recent change in the HPSI was positive, the forecast error was also positive, i.e., the actual house price growth rate was virtually always higher than forecasted when the HPSI had been rising. But, even for the nine times that the recent HPSI change was negative, average forecasts of house price growth were too low. The percent of (the total of 36) months when the forecast error and the recent HPSI change had the same sign, or "percent concordant," was 72 percent (=100*(26/36)).

For home sales, the relation between forecast errors and recent HPSI changes was statistically significant, more so than for house price growth and recent HPSI changes. But, relative to house price growth, home sales produced sign counts that were very little better than fifty-fifty (53%). While the signs were same (concordant) for 19 months, they were the opposite for 17 months. The relatively strong regression relation and relatively weak sign count results reflect that, relative to the case of house price growth, larger home sales forecast errors, whether positive or negative, tended to be associated with larger recent HPSI changes.

Errors in forecasting housing starts had the weakest regression relation with recent HPSI changes. The weak relation was mirrored in the results of sign counts for housing starts. In only five of the 22 months for which forecasts were higher than future housing starts were the recent HPSI changes also negative. While recent HPSI changes were positive for 10 of the 14 months that had positive forecast errors, concordance was only 42 percent (=100*(10+5)/36).

Originations forecast errors were related somewhat moderately to recent HPSI changes. Of the 22 months when originations were then surprisingly strong in the future, 18 of those months also had positive recent HPSI changes. On the other hand, of the 14 months when originations were surprisingly weak, for only 5 of those months were recent HPSI changes negative. Taken together, origination forecast errors and recent HPSI changes had the same sign nearly two-thirds (64%=100*(23/36)) of the time.

Table V-6

Signs of Forecast Errors and Signs of Recent Changes in the HPSI

(Errors=actual minus forecast averages, lagged three-month change in HPSI, monthly, July 2011 – June 2014)

1. House price growth	Sign of Recent HPSI Change	Sign of Forecast Error	
		+	-
	+	26	1
	-	9	0
	Same Sign (%) = 72		
2. Home sales	Sign of Recent HPSI Change	Sign of Forecast Error	
		+	-
	+	11	16
	-	1	8
	Same Sign (%) = 53		
3. Housing starts	Sign of Recent HPSI Change	Sign of Forecast Error	
		+	-
	+	10	17
	-	4	5
	Same Sign (%) = 42		
4. Originations	Sign of Recent HPSI Change	Sign of Forecast Error	
		+	-
	+	18	9
	-	4	5
	Same Sign (%) = 64		

VI. Building an Analog to the HPSI: MHPSI

In addition to serving as an indicator of current housing market conditions, the HPSI may serve well as a stand-alone indicator of future housing market conditions. Further, the HPSI may provide signals from consumers that can be used to improve forecasts for house prices, sales, starts, and mortgage originations.

Above, we highlighted the caveat that the HPSI is available only since March 2011. Since 2010, we have had an unusually tepid economic recovery, atypically low interest rates, large and steady increases in asset prices, and atypically weak housing markets, in addition to important changes in the operations and regulations of mortgage markets. Thus, the years since 2010 may be quite different than the years that preceded them. It is hard to know now how similar the data patterns and correlations in the coming years will be to the patterns and correlations that we saw between 2011 and 2015. As we noted earlier, however, a signal advantage of the NHS data is that it may well send signals that are provide much better and sooner than come from objective data.

The shifts and shocks in housing and mortgage markets since 2010 and the prospects of more of them in the coming years spurred us to look for more evidence about whether survey responses to housing-related questions were reliably related to ensuing housing market outcomes. Fortunately, we found some monthly survey data and generated some evidence for a much-longer period: 1992-2014. Of course, that longer period may also be unlike the years after 2014. But, those 23 years do include recessions and recoveries of varying amplitudes and durations, periods with and without a financial crisis, and periods with rising and falling, as well as generally higher, mortgage rates. Thus, this longer period may provide insights into the reliability of the connections between a survey-based housing index and future outcomes.

A. Housing Questions in the Michigan Survey

Since 1992, the University of Michigan Surveys of Consumers have been asking questions that are quite similar to some of the six NHS questions that comprise the HPSI. The Michigan survey asks many fewer housing-related questions, of course, and does not ask all of the questions that comprise the HPSI. (Until 2007, the Michigan survey did not include a question about future house prices.)

Below we show results of regressing one future (as usual, 12-month-ahead) housing market outcome, home sales, on several of the individual housing and non-housing questions that were in the Michigan survey. The estimates show that several of the Michigan questions that are analogs to the questions that we used to calculate the prototype HPSI were significantly related over the 1992-2013 period to future home sales.

Figure VI-1 plots monthly, annualized, per-capita, future home sales for 1992-2013. It also plots the first-difference (over the prior 12 months) of those sales. Because the size of the population becomes more relevant over longer sample periods, we adjusted sales for the size of the population. In Figure

VI-1 we can see the familiar long swings, as well as the shorter fluctuations, in home sales since the early 1990s. The correlation between the level and its first-difference here is 0.27.

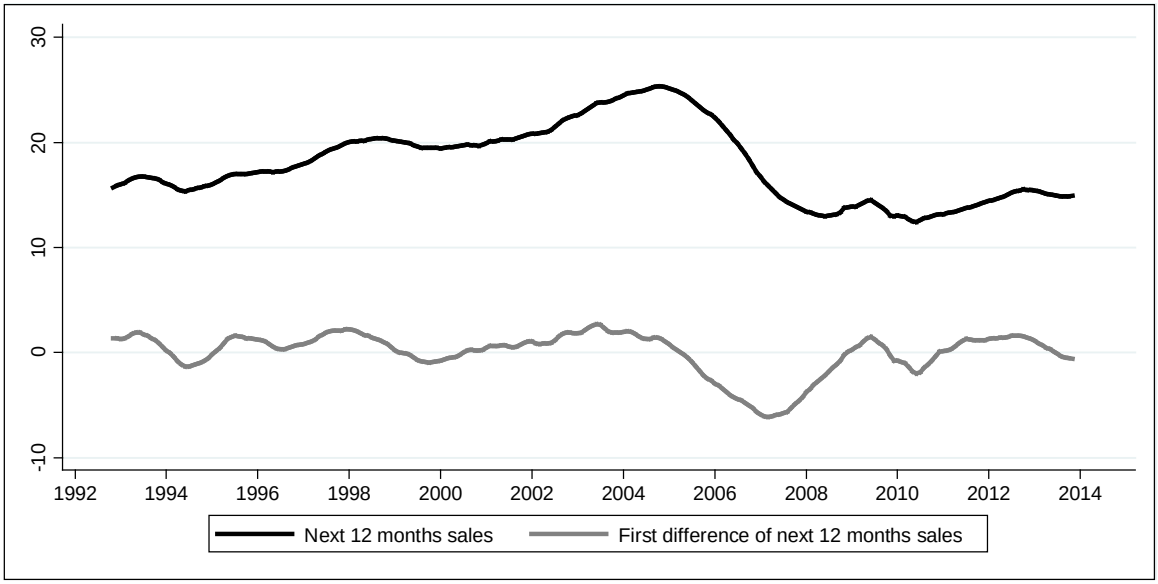


Figure VI-1: Population-Adjusted Home Sales Over Next 12 Months: Levels and First-differences

(Monthly, thousands of home sales per million people, November 1992 – December 2013,

seasonally adjusted, annual rate)

Table VI-1 shows the results of regressing the level and the first-difference of future home sales on a long list of candidate questions from the Michigan survey. For the level regression in column 1, we also included its lagged dependent variable, the level of (per capita) home sales over the prior four quarters. Column 1 shows that expected declines in unemployment or in interest rates significantly forecasted home sales. More responses that it was a "good time to sell a house" significantly, both economically and statistically, signaled more home sales in the future. "Good time to buy a house" was also somewhat significant.

Our arbitrarily including this large number of candidate questions, especially when some are quite similar, complicates inference about significance. Nonetheless we may be able to detect some patterns. The results in Table VI-1 suggest that some measure of overall business conditions was also likely informative about future sales. On the other hand, perhaps because of the inclusion of the four business-conditions and the one unemployment variables, we did not estimate strong, positive effects of personal finances or personal incomes.

Table VI-1

Estimated Relation of Michigan Survey Questions to Future Home Sales

(Monthly, averaged over horizon, population-adjusted, November 1992 – December 2013, seasonally adjusted, annual rate)

	Independent Variables: Michigan Questions	Dependent Variables:	
		Level of Home Sales	First Difference of Home Sales
1.	Past-year home sales	0.649***	
2.	Personal finances now better than a year ago	-0.0305**	-0.0365**
3.	Personal finances next year better	0.0297	0.0337
4.	Business conditions next year	-0.0237**	-0.00297
5.	Business conditions now better than a year ago	0.0144**	0.0335***
6.	Business conditions better next year	0.0580***	0.0693***
7.	Business conditions over the next 5 years	-0.00891	-0.0183
8.	Government economic policy performance	-0.00627	-0.0114
9.	Expected unemployment rate decline	0.0279***	-0.0056
10.	Expected interest rate decline	0.0274***	0.0395***
11.	Expected inflation rate	0.197	0.461**
12.	Expect higher income next year	-0.00505	-0.0342**
13.	Good time to buy a home	0.0143	0.0381***
14.	Good time to sell a home	0.0599***	0.0430***
15.	Good time to buy “big ticket” items	-0.0498***	-0.0662***
	Observations	253	253
	R-squared	0.941	0.734

Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels.

So that we could see if it would displace the housing-related variables, as shown in the bottom row of the table, we also included the question about whether "now is a good time to buy big-ticket items." This question is one of the five questions long-used to calculate the Michigan Index of Consumer Sentiment and is often regarded as being useful on its own for forecasting consumer spending.

First, note that the estimated connection of the "big ticket" question to future home sales was strongly significant but, a little surprisingly, negative. Second, despite the presence of the "big ticket" question, we estimated significant, positive effects of "good time to buy a house" and of "good time to sell a house", as well as of expectations of unemployment rates and of interest rates and other candidate variables. Thus, the housing-specific and other candidate questions add information that is pertinent to housing beyond the information in the "big ticket" question—it did not supplant them.

To guide our paring down the list of candidate Michigan questions in Table VI-1 to retain for the MHPSI, we again estimated stepwise regressions. Table VI-2 shows, for the level and for the first-differences of home sales, the questions that remained statistically significant. Only for Column 1 did we allow the stepwise procedure to consider the lagged dependent variable, whose estimated coefficient, not surprisingly, turned out to be large and strongly significant.

Column 3 shows that the questions with strong, positive connections to the levels of future home sales in column 1 also tended to have connections to the first-differences of sales. Expectations of stronger business conditions and of lower interest rates are two examples.

"Good time to buy" and "good time to sell" a house also were strongly and positively connected to future home sales. The strong showing of the "good time to buy" variable in Table VI-2 is reassuring, since the HPSI included "good time to buy" despite its relatively weak performance during the NHS sample period. Columns 1 and 3 show that, not only were the estimated connections of "good time to buy" statistically significant for the 1992-2013 period, but they were larger than the estimated coefficients for "good time to sell." However, over both the Michigan and the NHS sample periods, the net positive responses to "good time to sell" changed much more than the net positive responses to "good time to buy." Compared with the changes in "good time to buy," the changes in "good time to sell" were so much larger that, despite its having a smaller coefficient in column 1, "good time to sell" still accounted for more of the movements of home sales than "good time to buy" accounted for.

Table VI-2

Estimates of Stepwise Regressions of Future Home Sales on Michigan Survey Questions: 1992-2013

	Independent Variables: Michigan Questions	Dependent Variables:		
		Level of Home Sales		First Difference of Home Sales
		(1)	(2)	(3)
1.	Past-year home sales	0.694***		
2.	Business conditions better next year	0.0529***	0.0380***	0.0570***
3.	Expected interest rates to decline	0.0163***		0.0219***
4.	Expected rate of inflation			0.498**
5.	Good time to buy a home	0.0352***		0.0721***
6.	Good time to sell a home	0.0231***	0.0620***	0.00575***
	Observations	253	253	253
	R-squared	0.895	0.734	0.567

Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels.

B. An Equally-Weighted, Michigan-Based HPSI: MHPSI

On the basis of statistical evidence and judgment, we chose five housing-related questions from the Michigan survey to build an analog to the HPSI:

1. Is now a good time to buy a home?
2. Is now a good time to sell a home?
3. Are interest rates (not specifically mortgage rates) going to fall (or rise)?
4. Are personal finances now better than a year ago?
5. Is the unemployment rate going to fall (or rise)?

We refer to the resulting index as MHPSI. Like the HPSI, we calculated the MHPSI as an equally-weighted sum of the national, net-percent-positive responses to the five Michigan questions. We re-based the MHPSI so that it equaled 70 in its first month: November 1992. Higher MHPSI values presumably would signal stronger future housing market outcomes.

Figure VI-2 plots the resulting MHPSI along with the Michigan Index of Consumer Sentiment and the Conference Board's Consumer Confidence Index. The three indices mostly move in concert, but not always. For example, the MHPSI had historically been less volatile, experiencing smaller increases during the 1990s and smaller declines around the recessions of 2001 and 2007-2009. Most striking was that, while the general consumer indices were relatively stable as housing turned down after 2004, the MHPSI was declining steadily after 2004. More recently, the two general consumer indices have remained more volatile than the MHPSI, all three trended upward after hitting their nadirs near the time that the economy as a whole hit its nadir in early 2009.

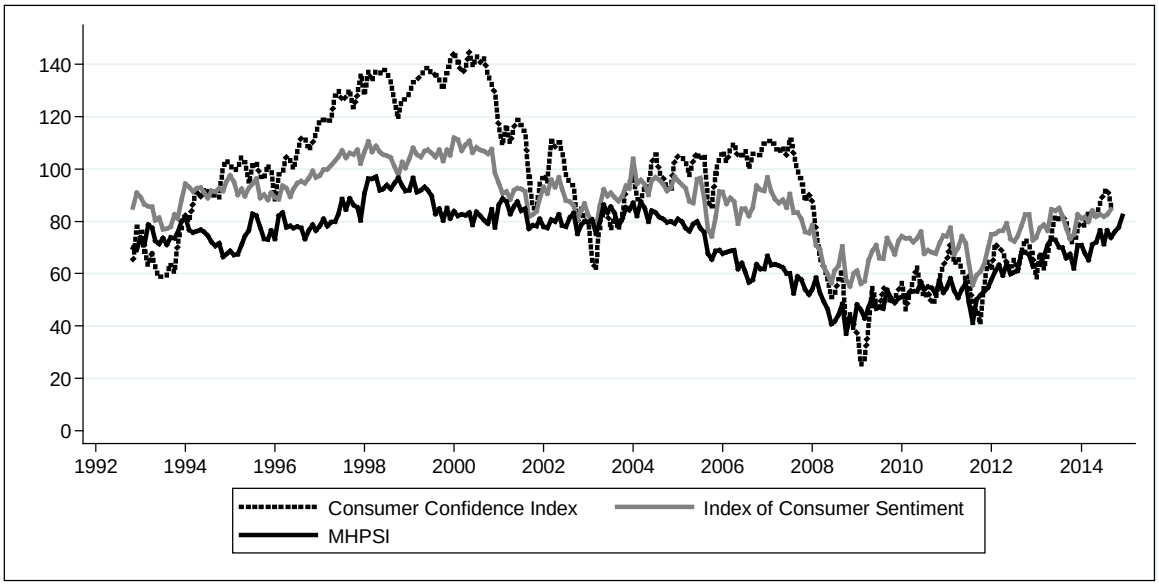


Figure VI-2: The MHPSI, the Consumer Confidence Index, and the Index of Consumer Sentiment

(Monthly, not seasonally adjusted, November 1992 – December 2014, MHPSI = 70 in November 1992)

Figure VI-3 compares the HPSI with the MHPSI for the period when they overlapped, starting in March 2011. The correlation between the two indices then was very high: 0.92. This suggests that the past values and forecasting performance of the MHPSI may be a useful guide to the usefulness of the HPSI for forecasting. Also notable is that the HPSI was been less volatile than the MHPSI during this period. One possibility, yet to be investigated, is whether the HPSI has less distracting "noise" than the MHPSI does. If so, its movements might provide cleaner signals than the Michigan-based index.

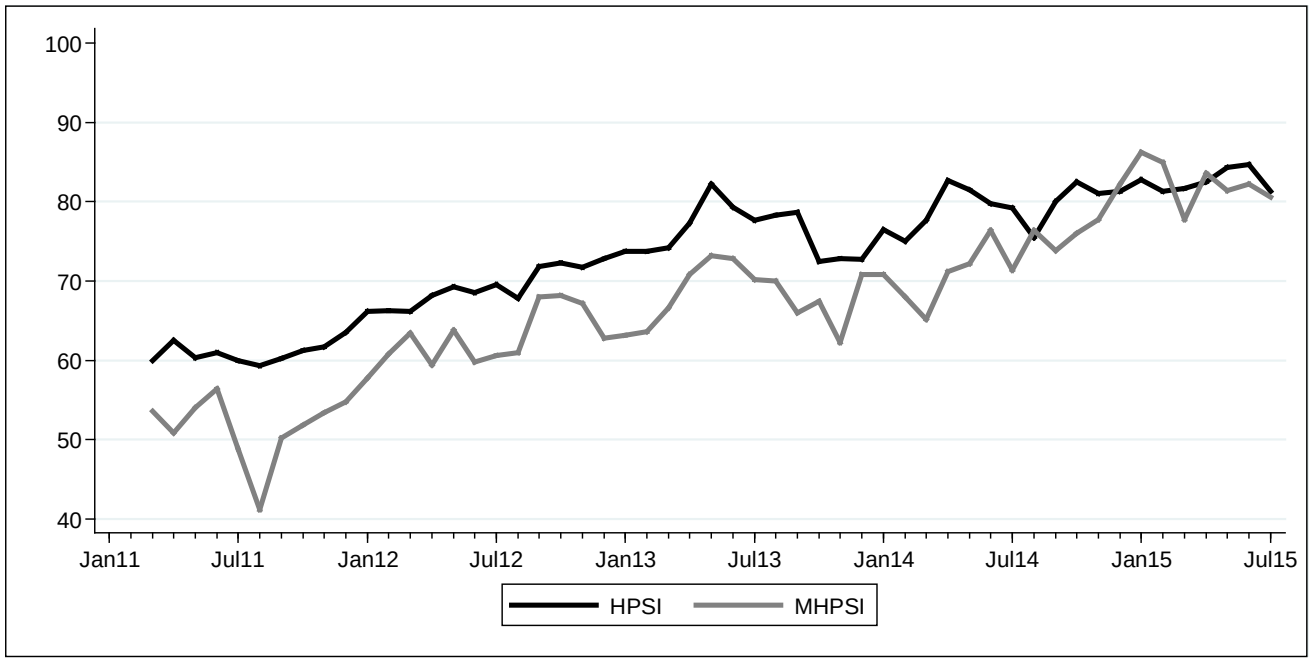


Figure VI-3: The HPSI and the MHPSI

(Monthly, not seasonally adjusted, March 2011 – July 2015)

C. Future House Price Growth and the MHPSI

Figure VI-4 mimics Figure V-3 while replacing the HPSI with the MHPSI and covering the longer, 1992-2014 period. Figure VI-4 plots the six- and the 12-month-ahead growth rates of house prices. Over this longer period, the correlation between these two house price growth rates was very high (0.97). Therefore, we confine our discussion below to the growth rate of house prices over the next 12 months.

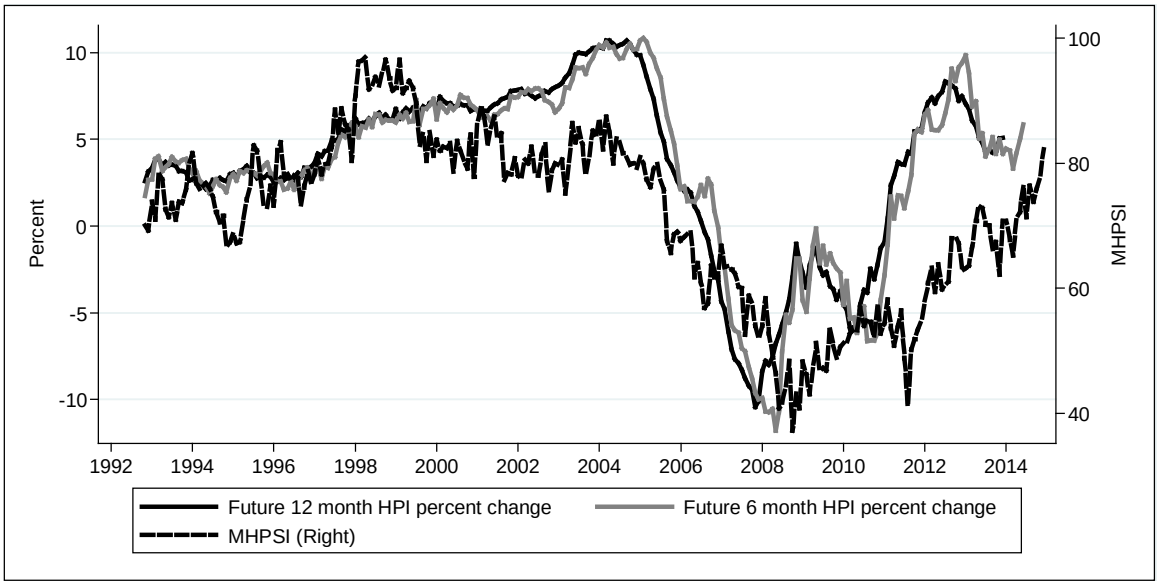


Figure VI-4: The MHPSI and HPI Growth Rates 6- and 12-months-ahead

(Monthly, November 1992 - December 2014, HPI: SAAR, MHPSI: not seasonally adjusted)

Figure VI-4 shows that generally the MHPSI was positively and fairly-highly correlated (0.71) with future house price growth. Sometimes, however, future house price growth diverged from the MHPSI. For example, the upward spike in MHPSI during the late 1990s was not matched by higher future house price growth rates. Nor was the 2011 downward spike in the MHPSI matched by sharply lower future house price growth. In addition, the amounts that future house price growth rates changed were not reliably related to how much the MHPSI changed. Turning points in the MHPSI sometimes preceded those for future house price growth (e.g., 2004-2005); other turning points of the HPSI lagged behind those of future house price growth (e.g., 2007-2008). And, although future house price growth rates began declining in 2012, the MHPSI generally continued its climb at least through the end of 2014.

Figure VI-5 mimics Figure V-4 while replacing the HPSI with the MHPSI and covering the longer 1992-2014 period. Mimicking what we did for the shorter, 2011-2014 period, the black, dashed line is an ex-post, or in-sample, forecast that equaled the fitted values of a regression of future house prices on the current MHPSI (and a constant term). Thus, the black, dashed line in Figure VI-5 is a simple, linear transformation of, and therefore is perfectly correlated with, the black, dashed line in Figure VI-4. However, with the far longer sample period, we also calculated the in-sample forecast (the gray, dashed line) for the earlier, 1992-2005 period. In addition, to calculate an "out-of-sample" forecast for house price growth for 2006-2014, we applied regression coefficients that were estimated from 1992-2005 data to later, actual survey data. While generally tracking future house price growth, the MHPSI-based, out-of-sample forecast missed the large increases in house price growth rates during 2004-2005 and large declines during 2007-2008.

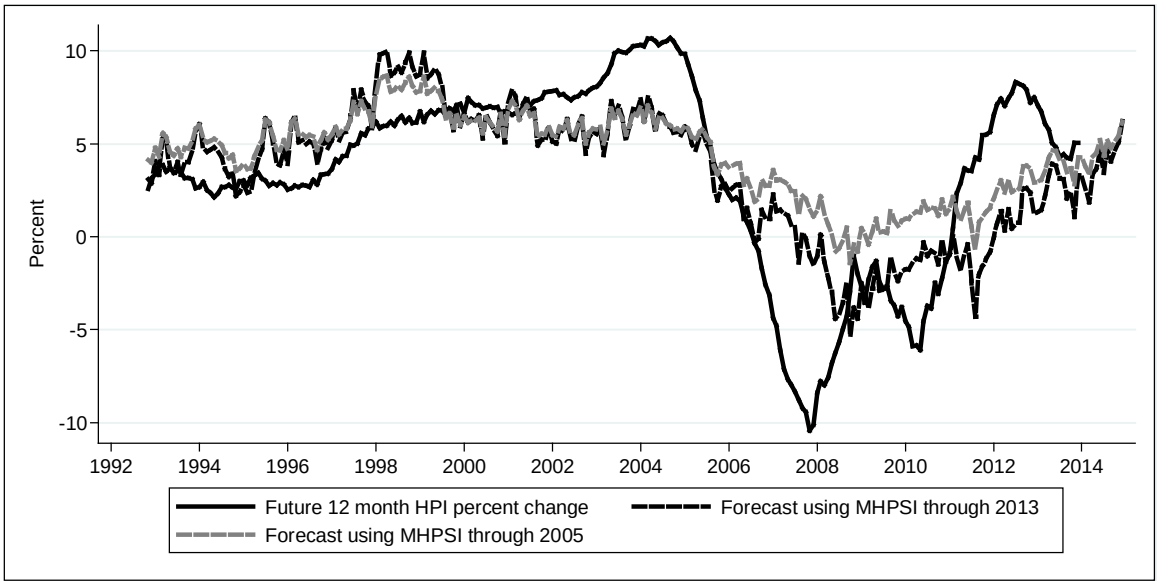


Figure VI-5: Forecasts of 12-month-ahead House Price Growth Rates: In-Sample and Out-of-Sample

D. Home Sales

Figure VI-6 mimics Figure V-7 while replacing the HPSI with the MHPSI and covering the longer 1992-2014 period. The figure shows that there is a broad, long-term correlation (0.71) between housing-related consumer sentiment (i.e., the MHPSI) and home sales per capita. Increases in housing confidence matched climbing future sales during 1992-1998 and since 2008, and decreases in confidence matched falling future sales during 2005-2007. However, falling confidence during 1999-2005 coincided with substantial growth in future sales.

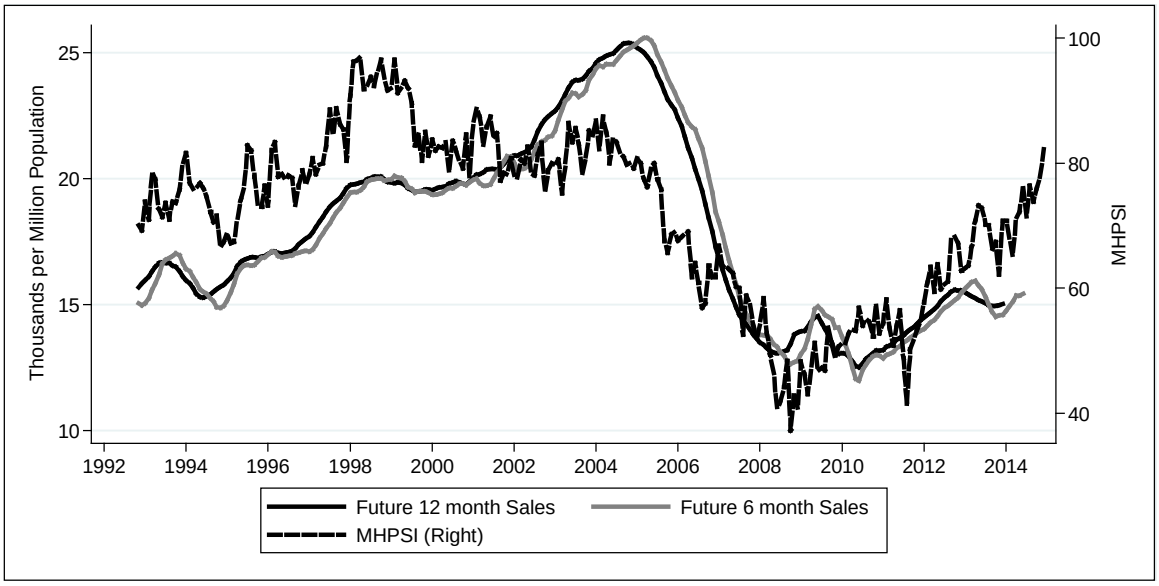


Figure VI-6: The MHPSI and 6- and 12-month-ahead Home Sales, 1992 – 2014

Figure VI-7 mimics Figure V-8, using the MHPSI instead of the HPSI, and 1992-2014 instead of 2011-2014, but includes two forecasts. Again, the black, dashed line is a simple ex-post in-sample forecast calculated as the fitted values of a regression of future home sales on the MHPSI. And, the gray, dashed line is calculated as an in-sample forecast for 1992-2005, and an out-of-sample forecast for 2006-2014 applying the coefficients obtained from 1992-2005. While these simple models capture the broad long-term links between confidence and home sales, they missed the large overshooting in home sales in 2002-2005 (upward) and forecast a stronger recovery in home sales than what has materialized recently.

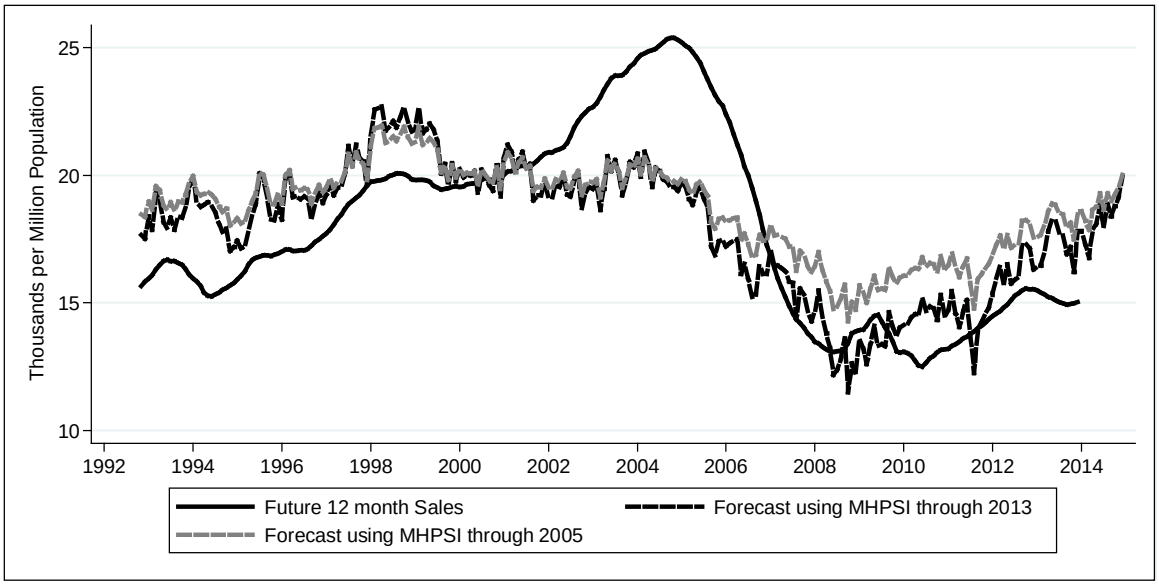


Figure VI-7: Homes Sales 12-months-ahead: Actual and Forecasts

E. Housing Starts

Figure VI-8 mimics Figure V-11 but uses the MHPSI instead of the HPSI and the longer period of 1992-2014 instead of the very short period of 2011-2014. The figure shows that there is a long-term link between housing-related consumer sentiment (i.e., the MHPSI) and housing starts per capita, with a correlation coefficient of 0.84. For instance, the roughly stable period of confidence during 1992-2001 was matched by stable levels of starts then. When confidence fell during 2004-2008, starts also fell. However, the large increase in starts during 2002-2005 was not matched by increases in confidence, and large increases in confidence since 2008 have been matched by only tepid growth in starts.

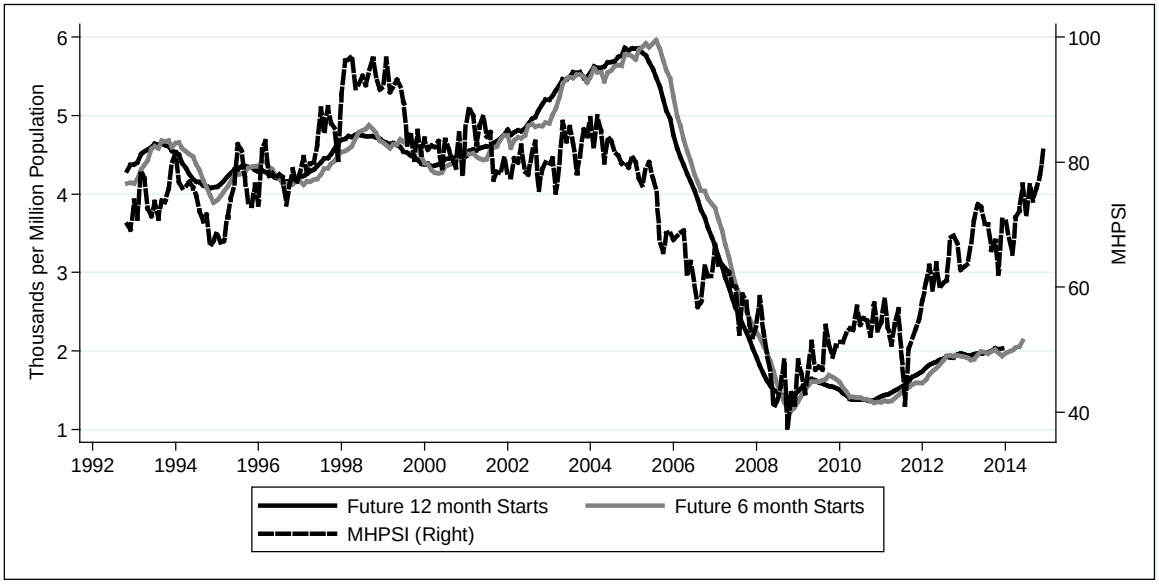


Figure VI-8: The MHPSI and Housing Starts 6- and 12-months-ahead, 1992 – 2014

Figure VI-9 somewhat mimics Figure V-12, using the MHPSI instead of the HPSI, and 1992-2014 instead of 2011-2014, but still using two forecasts. Again, the black, dashed line is a simple ex-post in-sample forecast calculated as the fitted values of a regression of future housing starts on the MHPSI. And, the gray, dashed line is calculated as an in-sample forecast for 1992-2005, and an out-of-sample forecast for 2006-2014 applying the coefficients obtained from 1992-2005. The figure highlights the difficulties of (unavoidably) relying on historical patterns to make out-of-sample forecasts. Thus, the black dashed line can, roughly, be made to fit actual future data by virtue of knowing the full extent of the declines in housing starts during the recent crisis. In contrast, by basing the relationship between confidence and housing starts on pre-crisis data (i.e., 1992-2005), such out-of-sample forecasts would (1) have largely missed (under-predicted) the crisis-related plummeting in housing starts and (2) continue to over-predict the current level of housing starts.

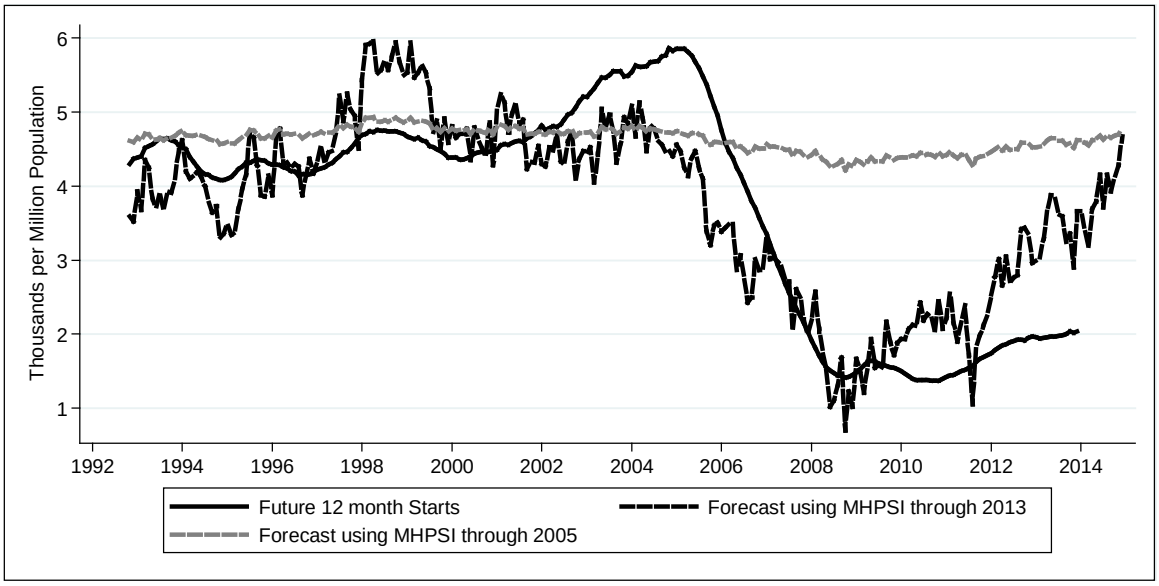


Figure VI-9: 12-months-ahead Housing Starts Forecasts

Table VI-3 shows the regressions that correspond to the figures immediately above. Each column in Table VI-3 shows the results of a regression of a 12-month-ahead outcome (house price growth, (population-adjusted) home sales, or housing starts) on the MHPSI. Estimates in columns 1, 3, and 5 were based on the entire, 1992 – 2013 estimation period. To show evidence for the period before the financial crisis, the estimates in columns 2, 4, and 6 were based on the shorter, 1992 – 2005 period.

For both the longer and the shorter sample periods, the MHPSI was significantly related to each of the three, 12-month-ahead outcomes. Over the less-volatile, pre-crisis period, the estimated MHPSI coefficients and the associated R-squared statistics were smaller than for the longer period, which included the years after 2005. These results bolster confidence that a sentiment index that focuses on housing can signal future developments and help improve forecasts for housing markets, both during placid as well as during turbulent times.

Table VI-3

Regressions of Future Housing Market Outcomes on the MHPSI

	Explanatory Variables	**House Prices**		**Home Sales**		**Housing Starts**	
		1992-2013	1992-2005	1992-2013	1992-2005	1992-2013	1992-2005
		(1)	(2)	(3)	(4)	(5)	(6)
1.	MHPSI	0.257***	0.169***	0.188***	0.128***	0.088***	0.012**
		(16.05)	(6.41)	(15.97)	(3.85)	(24.17)	(2.043)
2.	Constant	-14.9***	-7.68***	4.53***	9.51***	-2.58***	3.78***
		(-12.77)	(-3.61)	(5.29)	(3.53)	(-9.71)	(8.03)
	Observations	254	158	254	158	254	158
	R-squared	0.506	0.208	0.503	0.087	0.699	0.026

t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels.

F. Forecasting Horse Races

1. HPSI vs. Michigan-based HPSI

Here we compare the forecasting ability of the HPSI to a similar housing-related index that we built from five questions in the University of Michigan's Survey of Consumers. We used five questions from the Michigan survey that are similar to those we used to build the HPSI. Not surprisingly, the resulting Michigan-based index, which we refer as MHPSI, was highly correlated (0.93) over the March 2011-May 2015 period: Both series trended upward, sagged noticeably in the middle of 2013 and then in early 2014 generally resumed their upward marches.

A natural question is whether the HPSI adds to the information in the data for the long running questions in the Survey of Consumers? A statistical "horse race" is one time-honored source of information about that question. Columns 1, 3, and 5 in Table VI-4 show the results when we used the same estimation period of March 2011-December 2013 (again, to allow for outcomes 12 months into the future) to regress future housing market outcomes on the HPSI and the MHPSI simultaneously.

In its head-to-head race against MHPSI, the HPSI clearly won. Rows 1 and 2 in Table VI-4 show that three future housing outcomes (home sales, housing starts, or mortgage originations) were each significantly related to the HPSI, but not to the MHPSI.[34] Thus, HPSI adds to our ability to forecast housing market outcomes, even after controlling for the information in the Michigan-based HPSI, MHPSI. The source of HPSI's stronger performance, however, is unclear. One possibility is that it stems from differences in questions, e.g. the NHS asks specifically about mortgage rates, while the Michigan survey asks about borrowing rates in general.

2. HPSI vs. ICS and CCI

Another question is whether the HPSI improves forecasts once we take into account overall consumer sentiment. Figure VI-10 shows the HPSI, the ICS, and the CCI.[35] Given its focus on housing, we would strongly expect the HPSI to perform well in the horse race to forecast housing outcomes against the ICS or the CCI. Table VI-4 shows that it does. Columns 2, 4, and 6 show that each of the three future housing outcomes was significantly related to the HPSI but not significantly related to the ICS. Thus, the HPSI did then convey information about housing beyond that in the ICS.

While the contributions of national factors to the housing sector may have been unusually large since 2000, at the same time the housing sector diverged more than usual from the national economy. Times when it does diverge are periods when housing-focused information is more valuable and when indices of overall consumer sentiment might be less valuable for understanding and forecasting housing. Figure VI-10 illustrates that the HPSI declined much less than the ICS or the CCI declined in the second half of 2011. The HPSI also rose much less than the ICS and the CCI did after the middle of

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

[35] Absent the HPSI, the ICS was statistically-significantly related to each of the three future housing outcomes.

2014. The financial and thus political uncertainties that roiled Europe, and especially Greece, and the U.S., in connection with the federal debt ceiling difficulties, apparently depressed overall sentiment but left housing-related sentiment largely unaffected. The resulting declines in interest rates through the end of 2011 were very substantial and may reasonably have buoyed sentiments about housing, which has always been particularly interest-sensitive.

Table VI-4

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

	Explanatory Variables	**Home Sales**	**Home Sales**	**Housing Starts**	**Housing Starts**	**Originations**	**Originations**
		(1)	(2)	(3)	(4)	(5)	(6)
1.	HPSI	0.0245**	0.0344***	0.00626***	0.00865***	8.69***	10.61***
		(2.502)	(5.033)	(3.426)	(6.791)	(4.001)	(7.031)
2.	MHPSI	0.00978	---	0.0018	---	1.75	---
		(1.178)	---	(1.155)	---	(0.951)	---
3.	ICS	---	0.00069	---	-0.00050	---	-0.020
		---	(0.112)	---	(-0.436)	---	(-0.015)
4.	Constant	2.907***	2.767***	0.0317	0.0137	-73.55	-96.95
		(9.893)	(9.616)	(0.578)	(0.256)	(-1.126)	(-1.527)
	Observations	34	34	34	34	34	34
	R-squared	0.725	0.713	0.804	09.797	0.828	0.823

t-statistics in parentheses. Asterisks denote statistical significance at the 10 (*), 5 (**), and 1(***) percent levels. Forecasts over future 12-month intervals. The estimation period was March 2011-December 2013.

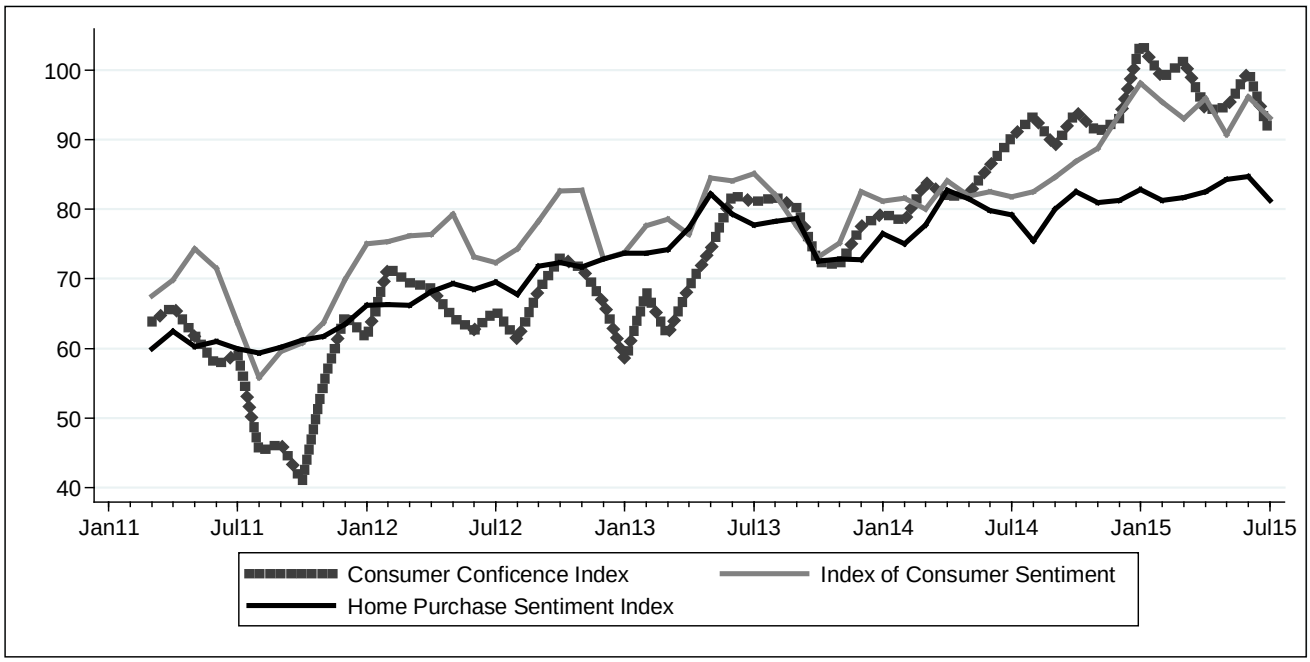


Figure VI-10: Consumer Sentiment Indices: ICS, CCI, and HPSI

(Monthly, March 2011 – July 2015)

VII. Conclusions and Discussion

Fannie Mae launched the National Housing Survey (NHS) in 2010 to produce new information about consumers' attitudes, intentions, and financial conditions that were likely germane to housing and mortgage markets. The NHS is the only large-scale, national, monthly survey of consumers that is focused exclusively on housing. Compared with traditional, objective data, survey responses can often better and sooner indicate how consumers interpret and then will act in the face of recent events and changed economic relationships. The traumatic events of the recent financial crisis and the Great Recession, and the resulting changes in the organization and regulation of mortgage and other financial markets, likely make the NHS now particularly valuable.

To distill effectively and efficiently the information in the NHS about consumers' housing-related attitudes, intentions, and conditions, we combined the answers to six NHS questions to form a prototype index of home purchase sentiment. Our index is similar in spirit to long-established indices of consumer sentiment and confidence. Our Home Purchase Sentiment Index (HPSI), which begins in March 2011, aims to indicate current housing market conditions and to provide signals about future conditions in housing markets. Based on their forecasting performance over 2010-2014 and our judgments, we chose questions that cover a wide range of factors that drive housing and mortgage markets. One of the strongest and most-surprising results of our analysis was the forecasting prowess of the question that asked consumers, not about buying, but whether it was a good time to sell.

Since it started in March 2011, increases in the HPSI were quite reliably followed by stronger housing markets. That suggests that the HPSI may be useful as a stand-alone indicator for housing markets. In addition, we found that recent changes in the HPSI were correlated to varying degrees with forecast errors made on average by housing-forecast organizations. The results suggested that forecasts for house prices particularly and for home sales and purchase-money-mortgage originations less consistently could have been more accurate during this period if they had been adjusted somewhat in the direction of recent changes in the HPSI. Confidence that the HPSI sends reliable signals about housing markets was bolstered by our finding, for the much-longer 1992 – 2013 period, that increases in an analogous index that we built from data from the University of Michigan Surveys of Consumers were also reliably followed by stronger housing markets.

The huge array of housing-related topics and questions in the NHS supplies broad, deep, and ever-growing amounts of data from which insights and lessons can be gleaned. These data can readily deliver custom indices for other groups of people and for various consumer circumstances. One example of a specialized, prototype index is a risk-oriented index that is aimed at gauging mortgage credit risks to lenders. Another is an index that attempts to indicate consumers' perceptions of the overall riskiness of home ownership.

Analysis and experience working with its data continues to generate useful, new ways to use the NHS. In addition to the national Home Purchase Sentiment Index, we briefly introduced sub-indices for age, income, homeownership, and regional groups.

Each month the NHS provides up-to-date information about consumers' attitudes and intentions toward housing. Additional data from the NHS will add to our confidence in longer-running relationships in housing markets. Additional NHS data will also spur new insights about older relationships and help identify newer relationships as they emerge and develop. And, the up-to-date data for consumers' attitudes and intentions from the longer-running questions, as well as from topical questions, in the NHS will likely inform housing market issues and puzzles that arise in the future.

VIII. Disclaimer

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APPENDIX A: SELECTED RESEARCH STUDIES OF CONSUMER SENTIMENT OR CONSUMER CONFIDENCE

Citation	Objective	Findings	Use of Index	Refers to ICS?	Refers to CCI?
Christopher D. Carroll, et al. (Dec. 1994), "Does Consumer Sentiment Forecast Household Spending? If So, Why?" 84:5 The American Economic Review 1397–1408.	"[T]he questions of interest are first, whether an index of consumer sentiment has any predictive power on its own for future changes in consumption spending, and second, whether it contains information about future changes in consumer spending aside from the information contained in other available indicators."	"[L]agged consumer sentiment has some explanatory power for current changes in household spending." "[L]agged values of the ICS, taken on their own, explain about 14 percent of the variation in the growth of total real personal consumption expenditures over the post-1954 period."	Regresses lagged values of the Index of Consumer Sentiment and a vector of control variables to examine the predictive power on real personal consumption expenditure.	Yes	No

John G. Matsusaka and Argia M. Sbordone (Apr. 1995), "Consumer Confidence and Economic Fluctuations," 33 Economic Inquiry 296–318.	"Our central purpose is to evaluate empirically how much truth there is, if any, to the idea that consumer sentiment causes fluctuations in GNP."	"Our main finding is that even after controlling for economic fundamentals and other good predictors of GNP, changes in consumer sentiment have a statistically significant effect on output fluctuations. . . . Our second finding is that while sentiment is not the most important factor in GNP fluctuations, it plays a quantitatively significant role: between 13 percent and 26 percent of GNP innovation variance can be attributed to innovations in consumer sentiment."	Performs vector autoregressions using the Michigan Index of Consumer Sentiment as a measure of consumer sentiment and the BEA Index of Leading Indicators as the main control variable.	Yes	No
Jason Bram and Sydney Ludvigson (June 1998), "Does Consumer Confidence Forecast Household Expenditure? A Sentiment Index Horse Race," 4:2 FRBNY Economic Policy Review 59–78.	"Does consumer sentiment provide economically meaningful information about future consumer spending beyond that already contained in other economic indicators? Is one attitudinal measure more informative than another?"	"Our empirical analysis suggests that consumer sentiment can help predict future movements in consumer spending; that forecasting power, however, depends on the survey in question. Measures of consumer attitudes available from the Conference Board have both economically and statistically significant explanatory power for several spending categories . . . even when the information contained in other economic indicators such as income, interest rates, and stock prices is known. Measures available from the University of Michigan's Survey Research Center, however, exhibit weaker forecasting power for most categories of consumer spending."	Measures of consumer sentiment are added to a baseline forecasting equation to test which, if any, improve the forecasting power of the baseline equation. In-sample tests investigate the predictive power of consumer sentiment over the entire sample period; an out-of-sample procedure tests the stability of that predictive power over several subsamples of the data.	Yes	Yes

E. Philip Howrey (2001), "The Predictive Power of the Index of Consumer Sentiment," 1 Brookings Papers on Economic Activity 175–216.	"This paper assesses the predictive power of the ICS, addressing two questions in particular. First, does the index, either alone or in conjunction with other indicator variables, sharpen predictions of recession and recovery? Second, does the index, either alone or in conjunction with other economic indicators, help to predict personal consumption expenditure?"	"It was found that the ICS, either by itself or in conjunction with one or more of the other indicators, is a statistically significant predictor of the future rate of growth of real GDP. Even though the index produces only a modest reduction in the standard error of one-quarter-ahead forecasts of the real GDP growth rate compared with a model based on lagged GDP only, it does produce a discernible increase in the accuracy of one- to four-quarter-ahead forecasts of the probability of recession." Another finding was that "the index is statistically significant and economically meaningful in terms of point forecasts of the rate of growth of personal consumption expenditure, but the relationship between monthly values is very noisy."	The ICS is employed as one of four candidate indicators possibly signaling recession in a vector autoregressive (VAR) model was used in the Recession Signal Model. "An error correction model was used to investigate the relationship between monthly personal consumption expenditure and the ICS."	Yes	No

Michael Lemmon and Evgenia Portniaguina (2006), "Consumer Confidence and Asset Prices: Some Empirical Evidence," 19:4 The Review of Financial Studies 1499–1529.	"[E]xplore the time-series relationship between investor sentiment and stock returns using consumer confidence as a measure of investor optimism."	"We find evidence that over the last two decades consumer confidence exhibits forecasting power for the returns on small stocks and for future macroeconomic activity...Our evidence indicates that the sentiment component of confidence forecasts time-series variation in the size premium after allowing for time-series variation in market beta...Consistent with this view, we find that the sentiment component of confidence also forecasts returns on stocks primarily held by individuals." "We also find that the sentiment component of consumer confidence is not strongly related to either the closed-end fund discount or the composite measure of sentiment constructed by Baker and Wurgler (2005)...Finally, we find no evidence that the confidence-based measure of sentiment forecasts the time-series variation in returns to value and momentum strategies."	"To test whether consumer confidence forecasts time-series variation in the size premium, we estimate OLS regressions in which [certain portfolio returns] computed over various holding periods are regressed on lagged measures of consumer confidence and control variables." The authors also conduct additional regressions to examine the forecasting power of consumer confidence on economic activity.	Yes	Yes

Kenneth L. Fisher and Meir Statman, "Consumer Confidence and Stock Returns," (Aug. 2002).	Evaluate whether falling stock prices erode consumer confidence or whether lower consumer confidence bring lower stock prices.	"We find that consumers grow confident when investors grow bullish. Consumer confidence declines when stock prices decline but investors need not fear that declines in consumer confidence would be followed by low stocks returns. Low consumer confidence is followed by high stock returns more often than it is followed by low stock returns."	Regresses both indices on various monthly returns, such as small cap returns, Nasdaq returns, and S&P 500 returns.	Yes	Yes
Francis A. Longstaff (Oct. 2002), NBER Working Paper No. 9312, "The Flight-to-Liquidity Premium in U.S. Treasury Bond Prices," National Bureau of Economic Research Working Papers.	"[E]xamines whether there is a flight-to-liquidity premium in U.S. Treasury bond prices... by comparing the prices of Treasury zero-coupon bonds with those of Refcorp zero-coupon bonds."	"We find that the yield spread between Refcorp and Treasury bonds is statistically and economically significant and is directly related to a number of variables such as consumer confidence, the amount of Treasury bonds repurchased by the Treasury, and flows into equity and money market mutual funds."	The authors use the CCI within their regression because a decline in the index "may signal that there is a greater wariness among market participants holding riskier assets, perhaps encouraging some to migrate to the safe haven of Treasuries." The analysis in part tests whether there is a negative relation between changes in consumer confidence and flight-to-liquidity premia.	No	Yes

Dean Croushore (2005), "Do Consumer-Confidence Indexes Help Forecast Consumer Spending in Real Time?" 16 North American Journal of Economics and Finance 435–450.	"[I]nvestigate whether indexes of consumer confidence are helpful in improving forecasts of consumption spending."	"The main finding is that the indexes of consumer confidence are not of significant value in forecasting consumer spending. In fact, in some cases, they make the forecasts significantly worse, suggesting that consumer-confidence surveys are no better than government data agencies in capturing information about consumer spending."	"Our empirical procedure will be to test forecasts to see if including the confidence indexes reduces the root-mean-squared-forecast error significantly."	Yes	Yes
Roy Batchelor and Pami Dua (1998), "Improving Macro-Economic Forecasts: The Role of Consumer Confidence," 14 International Journal of Forecasting 71–81.	"In this paper we ask whether the use of one type of leading indicator – an index of consumer confidence – could have significantly improved the model-based forecasts of real GNP produced by US economic forecasters over the past decade."	"We find that consumer confidence would have been helpful in predicting the 1991 recession. But the result does not generalize to other years, and appears to reflect the special nature of the recession rather than a persistent weakness in forecasting technique."	Runs various sets of regressions using the indices regarding present situation, expectations, and overall consumer confidence to test whether consumer confidence indices help to predict economic forecasts.	No	Yes

Roberto Golinelli and Giuseppe Parigi (2004), "Consumer Sentiment and Economic Activity: A Cross Country Comparison," 1:2 Journal of Business Cycle Measurement and Analysis 147–170.	"[R]eassess the validity of the consumer confidence (or sentiment) indices in anticipating the evolution of economic activity by considering a fairly high number of countries across the world (i.e. France, Germany, Italy, UK, USA, Japan, Canada and Australia) over a period of about thirty years."	"Our findings suggest that: (a) what appears to be the main driving forces of consumer confidence cannot be simply summarised on the basis of the most common and used macroeconomic variables; (b) consumer confidence indices have some ability to forecast the evolution of economic activity, provided that both their coincident nature is taken into account and that a number of data-coherent parameter restrictions are imposed in the VAR specifications."	"We model the CSI output relationship in a cointegrated vector autoregression (VAR) framework, by considering a common set of variables for all countries."	Yes	Yes
Shiu-Sheng Chen (2011), "Lack of Consumer Confidence and Stock Returns," 18 Journal of Empirical Finance 225–236.	"[I]nvestigates the link between the lack of consumer confidence and stock returns during market fluctuations."	"Empirical evidence using monthly returns on Standard & Poor's S&P 500 price index suggests that market pessimism has larger impacts on stock returns during bear markets. Moreover, the lack of consumer confidence leads to a higher probability of switching to a bear market regime."	Runs certain autoregression models to characterize fluctuations in the stock market and to "investigate whether the lack of confidence pushed the stock market into a bearish period."	Yes	Yes

Dragon Yongjun Tang and Hong Yan (2010), "Market Conditions, Default Risk and Credit Spreads," 34 Journal of Banking & Finance 743–753.	"[E]xamines the impact of the interaction between market and default risk on corporate credit spreads."	"At the market level, investor sentiment is the most important determinant of credit spreads. At the firm level, credit spreads generally rise with cash flow volatility and beta, with the effect of cash flow beta varying with market conditions. We identify implied volatility as the most significant determinant of default risk among firm-level characteristics. Overall, a major portion of individual credit spreads is accounted for by firm-level determinants of default risk, while macroeconomic variables are directly responsible for a lesser portion."	CDS data are aggregated into time series and regressed against several firm-level economic variables and macroeconomic variables, including a measure of sentiment. Regression analysis is conducted to assess the relative explanatory power of macroeconomic conditions and firm-level characteristics for credit spreads.	No	Yes
Manisha Singal (2012), "Effect of consumer sentiment on hospitality expenditures and stock returns," 31 International Journal of Hospitality Management 511–521.	"[E]xplore how consumer sentiment (i.e. confidence in the economy) affects consumption expenditures and stock returns in the hospitality industry."	"We find that not only does consumer sentiment partly predict changes in future consumption expenditures, but changes in consumer sentiment are contemporaneously related to hospitality industry stock returns. More importantly, our results indicate that changes in consumer sentiment can partly *predict* changes in stock prices of hospitality firms, an indicator of firm performance. The predictive ability of consumer sentiment can thus be useful to managers in business forecasting, planning, and strategizing for profit maximization."	Performs several regressions using both consumer indices, several macroeconomic variables, and a stock market return variable to examine "the role of consumer sentiment in hospitality consumption expenditures and the effect of changes in consumer sentiment on stock returns of hospitality industry firms."	Yes	Yes

Chienwei Ho and Chi-Hsiou Hung (2009), "Investor Sentiment as Conditioning Information in Asset Pricing," 33 Journal of Banking & Finance 892–903.	"This paper assesses whether incorporating investor sentiment as conditioning information in asset-pricing models helps capture the impacts of the size, value, liquidity and momentum effects on risk-adjusted returns of individual stocks."	"In our conditional framework, the size effect becomes less important in the conditional CAPM and is no longer significant in all the other models examined. Furthermore, the conditional models often capture the value, liquidity and momentum effects."	Constructs a composite sentiment measure using both the CCI and ICS, along with the Investors' Intelligence Survey Index, to perform a two-pass regression with monthly individual stock returns.	Yes	Yes
Kevin P. Christ and Dale S. Bremmer, "The Relationship Between Consumer Sentiment and Stock Prices," (July 15, 2003).	"This paper focuses on the short-run and long-run relationship between stock indices and measures of consumer sentiment."	"First, cointegration test confirm that there is no long-run relationship between different stock indices and the University of Michigan's measure of consumer confidence. Second, regarding the short-run relationship between stock indices and consumer confidence, Granger-causality tests indicate that stock prices affect consumer confidence, but consumer confidence does not affect stock prices. Third, while unexpected changes in consumer confidence have no statistically significant effect on stock prices, expected changes in consumer confidence are directly related to changes in stock prices."	To eliminate spurious regression results, cointegration tests are preformed to determine whether a long-run relationship exists between consumer confidence and each of the stock indices. As there is no long-run statistical relationship between consumer confidence and the stock indices, the possible short-run relationship was explored.	Yes	No

James A. Wilcox (Oct. 2007), "Forecasting Components of Consumption with Components of Consumer Sentiment," 42:4 Business Economics 22–32.	"We present new evidence that these long-available, but long-ignored, measures of consumer sentiment can reduce errors in forecasting total consumption and its components."	"The component questions of the aggregate Index of Consumer Sentiment improve forecasts of expenditures on durables as well as on non-durables and services. Measures of consumer sentiment seem particularly useful at the longer, four-quarter-ahead horizon. In addition, they typically contribute at least as much to one-quarter-ahead and four-quarter ahead forecasts as do income and wealth variables. Out-of-sample forecasts for the 2000-2005 period further substantiate that measures of consumer sentiment can reduce consumption forecasting errors appreciably."	Uses vector autoregression to generate forecasts for multiple four quarter periods to measure the reduction of errors in forecasting total consumption expenditures and its components.	Yes	No

APPENDIX B: DATA AND SOURCES

FHFA House Price Index – Federal Housing Finance Agency, monthly house price purchase-only house index, seasonally adjusted

http://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index.aspx

New Single Family Home Sales – U.S. Census, New Residential Sales, monthly and seasonally adjusted (Table 1 New Houses Sold and For Sale)
https://www.census.gov/construction/nrs/index.html

Existing Home Sales - National Association of Realtors (NAR), Home Sales, Single-Family, Condos and Co-Ops ,monthly, seasonally adjusted. http://www.realtor.org/topics/existing-home-sales

Single Family Housing Starts – U.S. Census, New Residential Construction, 1-4 Units, monthly, seasonally adjusted (Table 3 New Residential Construction).
http://www.census.gov/construction/nrc/index.html

Originations version 1 (used to create Figure V-14 only) – Mortgage Bankers Association (MBA), Single Family, Purchase Loan Originations, quarterly and not seasonally adjusted.
https://www.mba.org/news-research-and-resources/forecasts-data-and-reports/forecasts-and-commentary

Originations version 2 (used for forecasts and Figures V-15 – V-17) – Fannie Mae, ESR, internal estimates, quarterly, not seasonally adjusted

Survey of Consumers – University of Michigan Survey of Consumers, monthly, not seasonally adjusted http://www.sca.isr.umich.edu/

National Housing Survey – The National Housing Survey, monthly, not seasonally adjusted, selected survey data are available publicly at http://www.fanniemae.com/portal/research-and-analysis/housing-survey.html