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Recent Weakness in Housing Activity and the Staff Outlook for the Housing Sector

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Residential construction, home sales and house prices rose briskly from early 2012 to mid-2013, suggesting that housing demand had finally started to pick up following the severe housing market contraction and prolonged trough. However, from mid-2013 to the spring of 2014 single-family construction was flat and home sales fell nearly 15 percent. Although we had expected the sharp rise in mortgage interest rates that occurred in the spring of 2013 to slow the growth in housing activity, the magnitude and persistence of the deceleration has taken us by surprise. In this memo, we present the framework that we use to analyze housing market activity in order to assess explanations for this surprise and its implications for our outlook for the housing sector.

We begin by describing our main forecasting model of residential investment. The model did predict that the rise in mortgage rates would damp investment growth, but by a much smaller amount than the actual slowdown in investment. We discuss several ways in which the rise in interest rates may have had a larger or more prolonged effect than estimated by the model. We also assess evidence for a number of other factors that may have exacerbated the deceleration in housing market activity, the most plausible in our view being a dwindling supply of distressed property and supply constraints in the residential construction sector. Next we outline a number of headwinds in the housing sector that have been restraining activity since the end of the housing crisis (even though they may not have had much to do with last year's deceleration). Finally, we present our projection for housing activity going forward and highlight a number of reasons for the substantial degree of uncertainty around our projection.

1. A framework for analyzing residential investment

The main framework that we use to analyze housing activity is a quarterly model of residential investment. Residential investment comprises construction expenditures on new single-family housing, new multi-family housing, and improvements, as well as commissions and fees on the sale of residential property, and a few other small components. Thus, this measure summarizes a variety of activities in the housing market.

We typically approach residential investment from the perspective of a household, whose desire for housing services is assumed to be increasing in the household's wealth and income and decreasing in the user cost of housing, and we follow several empirical models that embody this perspective.[1] The model that we have found most useful in recent years links changes in residential investment to deviations of investment from a long-run level (which we refer to as "target" investment) implied by wealth, income and its user cost:

$$\Delta \ln(i_t) = \beta_0 + \beta_1(i_{t-1}^* - i_{t-1}) + \beta_2 \Delta \ln(i_{t-1}) + \beta_3 \Delta \ln(i_{t-2}) + \beta_4 \Delta \ln(gdpxi_t)$$
$$+ \beta_5 \Delta(frm_{t-1}) + \beta_6 \Delta(frm_{t-2}) + \beta_7 \ln(p_t / p_{t-8}) + u_t \tag{1}$$

$$i^* = f\left(wealth, income, usercost\right) \tag{2}$$

where i is residential investment, i^* is target investment, $gdpxi$ is GDP growth excluding residential investment, frm is the 30-year fixed mortgage rate, and p is the CoreLogic house price index. In the equation above, the output growth term reflects cyclical fluctuations in income that are not captured by the long-run dynamics embodied in i^*. Similarly, the mortgage rate and house price terms reflect higher-frequency correlations between investment and the user cost. In constructing our proxy for the user cost, we use the change in house prices over the preceding eight quarters on the assumption that expectations tend to be backward-looking and tend to change slowly.[2]

Figure 1 shows a dynamic simulation of the model jumping off of the third quarter of 1978. The model is able to account for the behavior of residential investment fairly well over the past 35 years. Importantly, the close fit of the model is *not* a true measure of its predictive power because it is estimated on data through 2012 and is based on the actual evolution of the independent variables, rather than the staff forecasts of these variables. Nevertheless, we take the in-sample fit as an indication that the estimated coefficients provide a reasonably good approximation for typical correlations between investment and these independent variables.

Figure 2 illustrates a recent example of how the model forecast can deviate from realized outcomes by showing a model simulation that begins in the third quarter

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[1] Following the standard Hall-Jorgenson rental rate formula we express the user cost as a function of the relative price of housing, the mortgage rate (adjusted for personal income and property taxes), depreciation, the expected capital gain from housing investment (which we model as the 8-quarter change in house prices) and a risk premium (which we assume to be 2 percent).
[2] For example, Piazzesi and Schneider (2009) and Lambertini, Mendicino and Punzi (2013) show that house price expectations tend to be higher in housing booms.

of 2013. Whereas the model expected residential investment to rise by 6 percent over the subsequent four quarters, we estimate (albeit on the basis of incomplete source data for the second quarter) that investment was nearly flat over this period.

It is possible that the divergence between the model forecast and the realized pattern of investment was exaggerated by the unusually cold and wet weather around the turn of the year. However, adverse weather typically pushes single-family starts back only a month or two, and it seems implausible that this year's weather can explain why the level of construction has stayed so low through June. Moreover, the deceleration in sales and construction also occurred in regions of the country where the weather was not much worse than average.

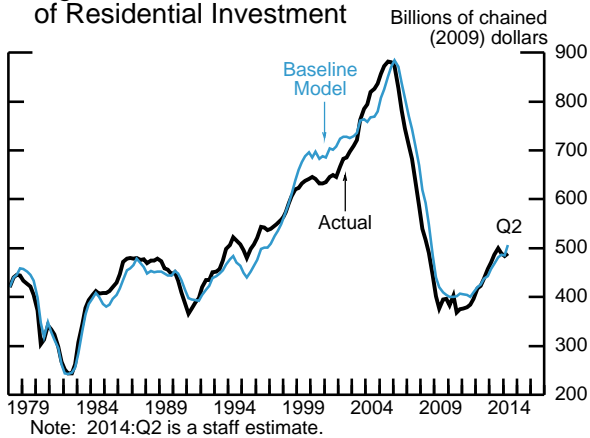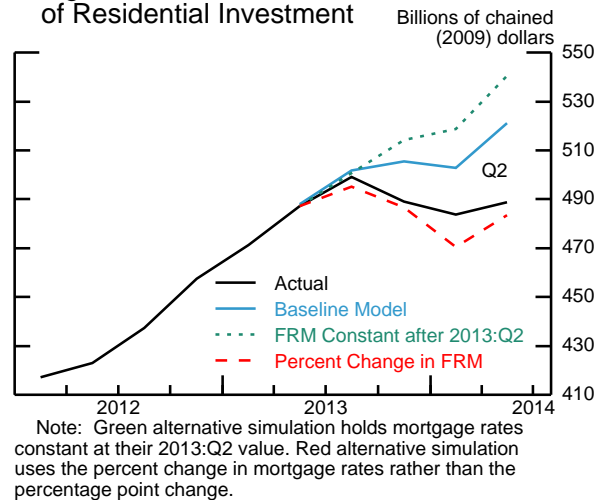Figure 1: Actual and Predicted Levels of Residential Investment

Billions of chained (2009) dollars

Note: 2014:Q2 is a staff estimate.

Figure 2: Alternative Simulations of Residential Investment

Billions of chained (2009) dollars

Note: Green alternative simulation holds mortgage rates constant at their 2013:Q2 value. Red alternative simulation uses the percent change in mortgage rates rather than the percentage point change.

2. Explanations for the deceleration of residential investment

The rise in mortgage rates

Perhaps the most natural explanation for the lackluster performance of residential investment in recent quarters is the sharp rise in mortgage rates that occurred in the spring of 2013. To be sure, the model did expect the rise in rates to reduce investment growth around the turn of the year (see the green dotted line in Figure 2). However, the deceleration in investment that occurred was much greater than expected. Consequently, the first question that we explore is whether the effect of this increase in mortgage rates may have been larger and more prolonged than suggested by historical experience.

The model estimates the effect of mortgage rates based on its average correlation with investment in recent decades. Although the magnitude and duration of the impact of an increase in mortgage rates does not seem to be the same in every case, only rarely has investment continued to fall for two quarters after the initial rise in rates (as it has in the current case).
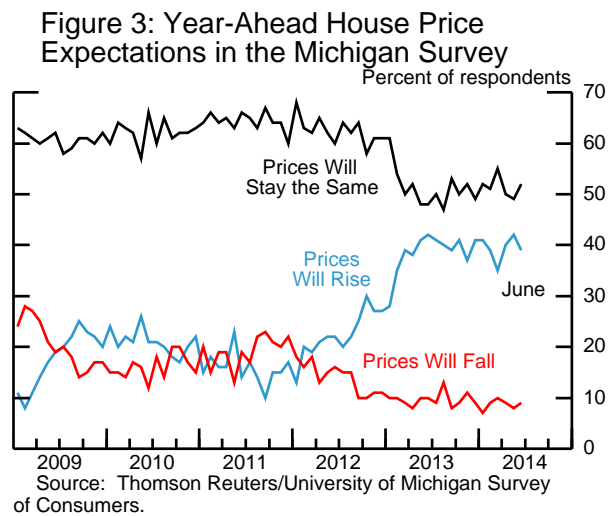
One reason why changes in mortgage rates may have larger effects now than in the past is that the level of rates is so low, and it may be the *percent* change in borrowing costs that matters to borrowers if they ultimately care about proportional changes in their monthly payment. We can consider this possibility by replacing the first difference in mortgage rates in equation (1) with the percent change in rates. Figure 2 shows this alternative model simulation, which predicts a pattern of investment through the first half of 2014 that is more in line with actual investment. One important caveat is that, in the estimation period, the largest divergence between the percentage point change in mortgage rates and the percent change in mortgage rates occurred in recent years, so the results of this alternative model may reflect some other omitted factor that became more important in the post-crisis period.[3]

Another way in which the rise in mortgage rates might have had a larger and more prolonged effect on housing activity is if it altered people's expectations about future increases in house prices. With a large number of media reports in the summer of 2013 speculating about the potential drag on housing from the rise in mortgage rates, it would not be surprising if this event altered the expectations of potential homebuyers. Indeed, as shown in Figure 3, the fraction of Michigan Survey respondents who expected house prices to rise in the next year flattened out around mid-2013 after having moved up steadily in the previous two years. Of course, we cannot rule out that this change in expectations was the result of other factors contributing to last year's housing slowdown.[4]

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[3] In the model, the coefficients on the change in mortgage rates are allowed to be different after 1983 because the final repeal of Regulation Q in the 1980s seems to have altered the correlation between mortgage rates and investment. From 1983 to 2012, the largest difference between the percent change in rates and the percentage point change in rates was in the most recent few years.

[4] To gauge whether changes in house price expectations could have been large enough to account for the observed pattern of residential investment, we calculated an alternative simulation of the model assuming that after the second quarter of 2013 house price expectations held steady at their Q2 level. This simulation lies about halfway between the baseline model (shown in figure 2) and actual investment.

Figure 3: Year-Ahead House Price Expectations in the Michigan Survey

Source: Thomson Reuters/University of Michigan Survey of Consumers.

Based on the analysis above, the rise in mortgage rates very likely caused a deceleration in residential investment, and it even seems plausible that this drag could have been larger than predicted by the baseline model. However, we view it as unlikely that this channel can explain the entire deceleration in housing activity for at least two reasons. First, we expect a rise in rates to reduce the demand of buyers who finance their purchases with a mortgage by more than that of buyers who use other means of financing.[5] However, the share of purchases financed by mortgages *rose* in the second half of last year—i.e. mortgage-financed purchases fell less than non-mortgage-financed purchases.[6] Second, the deceleration in existing home sales was much larger than that of new home sales and single-family starts. Yet historically, the correlation between existing home sales and mortgage rates has been smaller than the correlation of rates with these other types of housing activity.

The supply of distressed property and investor activity

As we noted above, last year's deceleration in existing home sales was especially pronounced, creating a drag on residential investment through the channel of sales
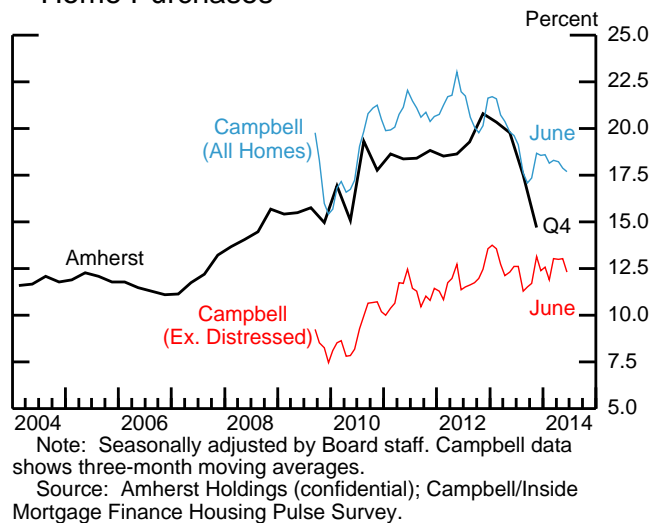
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[5] Some buyers who do not use mortgage financing probably borrow through other channels, so changes in shorter-term rates would affect their borrowing costs. In 2013, the rise in mortgage rates was larger than the rise in short-term rates, so one would still expect the borrowing costs of these buyers to have gone up by less than the costs of mortgage-financed buyers. Of course, if the rise in mortgage rates caused a substantial deterioration in house price expectations, then demand by both mortgage-financed and non-mortgage-financed buyers might be affected.

[6] This increase appears to be related to a decrease in sales of distressed property, which we will discuss below. In the Campbell Survey, the fraction of non-distressed sales that were financed by a mortgage was roughly flat in the second half of last year—a trend that still seems inconsistent with what one would expect from the rise in mortgage rates.

commissions. One factor that has likely exacerbated the weakness in existing home sales is that the supply of distressed property coming onto the market has been shrinking and is approaching its pre-crisis level. After peaking at an annual rate of 1.2 million in the first half of 2010, the number of properties for sale at foreclosure auctions was down to an annual rate of 0.5 million in the first quarter of 2014, a level not seen since the first half of 2007.[7] Moreover, changes in the tax treatment of short sales in January 2014 reduced the attractiveness to underwater homeowners of selling short. Because this legislative change was known in advance and the timing of a short sale is difficult for a seller to predict, this tax law change seems to have begun reducing short sales around mid-2013.

The hypothesis that a diminished supply of distressed properties accounts for some of the reduction in existing home sales is corroborated by the fact that investor purchases have accounted for a smaller portion of total sales lately. (Investors tend to be disproportionately important in the market for distressed properties.) As shown in Figure 4, the investor share of sales moved down over the second half of last year (the Amherst data shown in the chart are confidential). By contrast, investor activity does not seem to have declined more generally—the investor share of non-distressed properties (the red line) has been flat over the past several years. In fact, even when including distressed sales the investor share remains elevated relative to its pre-crisis level.


Figure 4: Investor Share of Home Purchases

Note: Seasonally adjusted by Board staff. Campbell data shows three-month moving averages.
Source: Amherst Holdings (confidential); Campbell/Inside Mortgage Finance Housing Pulse Survey.

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[7] Of course, the number of homes in the foreclosure process remains high in some areas, for example in some states with judicial foreclosure laws.

Moreover, sales did not decelerate more in metropolitan areas that had a higher share of investors in 2012 or a larger increase in the investor share from 2011 to 2012.[8] In sum, the decrease in the aggregate investor share seems to reflect a diminished supply of distressed properties, not an independent decrease in investor demand.

Supply constraints in the residential construction industry

For the past few years we have heard many anecdotes that point to limited availability of key construction inputs, such as skilled labor, materials, and developed lots in desirable locations. In fact, average hourly earnings of residential construction workers have been rising by roughly 5 percent per year since late 2012, much faster than the average growth rate for these workers during the previous three years, and faster than the average growth rate for the typical production worker in other industries (see Figure 5).[9]

Figure 5: Average Hourly Earnings of Production Workers

Source: Bureau of Labor Statistics.

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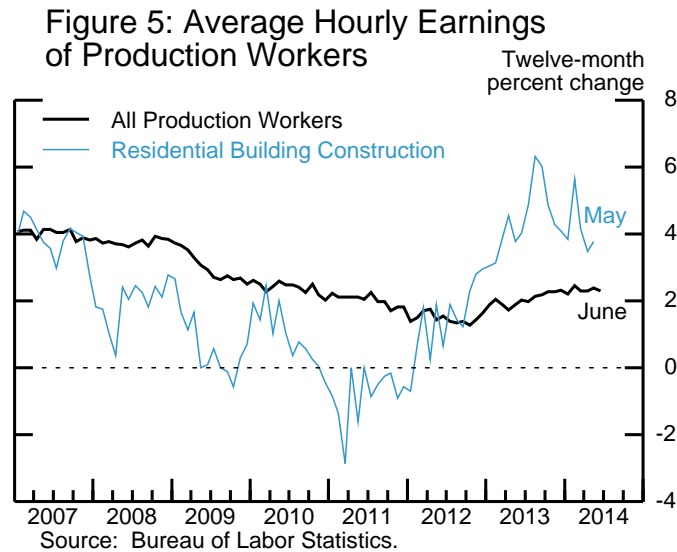
[8] One group of investors that has received much media attention is Wall Street firms that have been buying single-family properties to convert into large portfolios of rental units. Although purchases by these investors subsided in the second half of last year, this contraction cannot account for much of the deceleration in aggregate sales activity because their share of the market was so small—in the first half of 2013 they accounted for only 2 percent of aggregate purchases.
[9] Moreover, the workweek of production workers in the construction industry has averaged around nearly 40 hours per week since early 2013, the highest level that has prevailed since 1947 when these statistics were first recorded.

As for other inputs, high default rates among land developers and tight lending conditions for land acquisition and development have dramatically reduced the pipeline of vacant developed lots. Restrictions on the supplies of these key inputs may have become more binding over the course of 2013 as the level of construction rose, further limiting new construction and new home sales. The staff model would not adequately capture these constraints because it assumes (through the coefficient on target investment) the response of supply to changes in demand is constant over time.

What do house prices tell us?

One piece of evidence that appears to support the importance of supply constraints more than a demand-related explanation is that house price growth remained robust through at least the end of 2013. In particular, the Zillow House Value Index, the CoreLogic Index, and the Case-Shiller National Index all report annualized growth rates between 8 and 11 percent for the second half of 2013, increases that are in line with those seen in 2012 and the first half of 2013. If there had been a sizable drop in housing demand in the second half of 2013, we would have expected to see a deceleration, if not an outright decline, in house prices.

One possibility that could square a demand-related explanation with the evidence from house prices is that the strong positive serial correlation in house price changes might have masked the weakening in demand for a time. Strong momentum in house price changes, which has been documented by many researchers, can arise when the optimal list price of a house depends on recent transaction prices and list prices adjust infrequently (Guren 2014). In fact, the CoreLogic and Zillow indexes appear to have decelerated markedly in the first five months of 2014, providing at least some support for the idea that housing demand cooled in the second half of last year.

Notwithstanding the momentum in house prices, the evolution of house prices over the past year suggests that the supply of homes for sale has not kept pace with demand, putting additional upward pressure on house prices. A number of other housing market indicators also point in this direction. For example, the number of existing homes for sale has been on the low end of its range of the past several decades, and the time on market of existing homes has fallen considerably since early 2013. The lack of distressed inventory and constraints on new construction have likely contributed to the shortfall of supply relative to demand. In addition, constraints on the number of nondistressed homes on the market— driven by homeowners that are not willing or able to sell at a price lower than at which they purchased the property or that have a mortgage with an interest rate

that is much lower than the prevailing rate—may also be restricting the number of homes for sale. Of course, many existing home sellers are owner-occupants and so might also be buyers if they were to put their home on the market. In that sense, the magnitude of this effect on the aggregate net supply of homes on the market is unclear.

3. Persistent headwinds

In addition to the recent changes in the housing market discussed above, a variety of factors beyond those captured by our usual models have been putting downward pressure on housing activity since the end of the housing crisis. While it seems unlikely that they can account for the *slowdown* in activity in the second half of last year, these factors still have an important influence on our outlook for housing during the years ahead.

First, tight credit conditions continue to restrain mortgage originations. The distribution of credit scores among newly originated mortgages for home purchases shifted up significantly during the financial crisis and has only recently shown any nascent signs of edging back down. At the same time, mortgage bankers' commentary suggests that lenders' perceptions of the risk surrounding representations and warranties (often called "put-back" risk) continue to weigh on their willingness to lend, especially in the less qualified segments of the mortgage market. Also, a number of regulatory changes in the past year have increased the costs to borrowers of FHA loans.

Tight credit conditions have likely contributed to a shift in demand from owner-occupied to rental housing.[10] Changes in demand for homeownership have resulted in the conversion of single-family housing units from owner-occupancy to rental—the share of occupied single-family housing that is renter-occupied increased from 15 percent in 2006 to 18 percent in 2012. In addition, the relative demand for renting has been manifested in construction patterns. In 2013, starts of multifamily housing units intended for rental were 30 percent of total starts, their largest share since 1985. Because the cost per start of a multifamily unit is, on average, only half that of a single family unit, a higher share of multifamily construction implies less residential investment, all else equal.

Subdued real income growth for households outside of the top of the income distribution may be further weighing on housing demand. For example, in the

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[10] In addition, the housing crisis and severe economic recession may have intensified risk aversion towards housing investment. For example, a larger-than-normal fraction of Michigan Survey respondents say it is a bad time to buy a home because "bad times are ahead" or "the future is uncertain."

Survey of Consumer Finances, real incomes in the lower half of the distribution fell by 5 percent from 2009 to 2012, and real incomes in the next 40 percent of the distribution were flat.[11] Slow income growth can hamper a household's ability to save for a downpayment and make it more difficult to satisfy the maximum debt-to-income ratio that is required by the QM rule.

However, and perhaps surprisingly, the available evidence does not appear to support the idea that weak income growth has restricted mortgage availability. As shown by Figure 6, home purchases by borrowers of all income levels above the 25th percentile rose from mid-2010 to mid-2013, despite the weak income growth experienced by many of these groups. Moreover, as shown by Figure 7, since the end of the first-time homebuyer tax credit in 2010, the share of first-time homebuyers has oscillated in a narrow range round its pre-crisis average, indicating that the purchase activity of first-time homebuyers has risen along with that of repeat-buyers.[12] First-time homebuyers generally fall into lower deciles of the income distribution and frequently rely on mortgage credit to finance their home purchases, so one would expect slow income growth to restrain purchases by first-time homebuyers by more than repeat buyers.

Figure 6: Mortgage Originations by Income Group
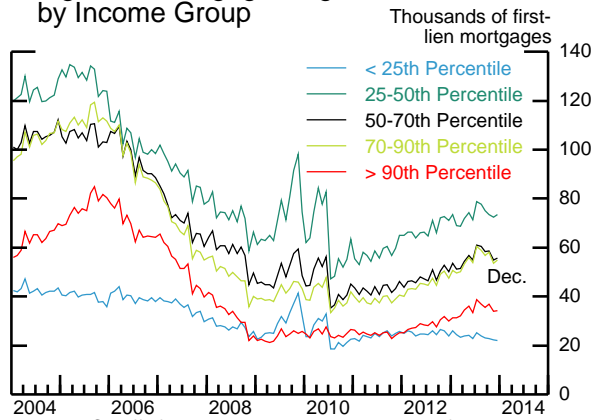
Note: Cutoffs for income distribution calculated from March Current Population Survey.
    Source: Home Mortgage Disclosure Act.

Figure 7: First-Time Homebuyer Share of Home Purchases
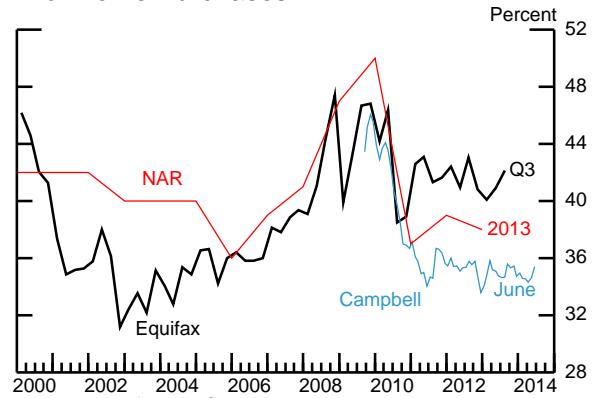
Note: Equifax and Campbell data seasonally adjusted by Board Staff. Campbell data shows three-month moving average.
    Source: FRBNY/Equifax Consumer Credit Panel; Campbell/Inside Mortgage Finance Housing Pulse Survey; National Association of Realtors.

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[11] Results from the 2013 Survey of Consumer Finances are preliminary and confidential.

[12] The data in the figure are derived from three data sources that cover somewhat different segments of the market. In particular, the share from the National Association of Realtors (NAR) is constructed from a sample of owner-occupiers, the share from the FRBNY-Equifax Consumer Credit Panel is constructed from a sample of mortgage originations, and the share from Campbell Survey is constructed from a sample of sales through Realtors.

Even if it has not restricted mortgage credit, slow income growth at the lower end of the income distribution may still have reduced housing demand because new households tend to be formed by young adults and young adults tend to have lower-than-average income.[13] In fact, household formation averaged roughly ½ million per year from 2009 to 2013, less than half of its average in the 20 years prior to the housing boom.

The run-up in student loan balances on household balance sheets in the past few years may also be restraining household formation and homeownership among young households by making it more difficult for these households to come up with a downpayment or meet debt-to-income requirements, as well as reducing their willingness to take on additional debt.[14] Surveys of young adults suggest that student loans cause some young adults to delay home purchases and heighten concerns about saving for a downpayment.[15] However, empirical analyses that attempt to estimate the effect of student loans on homeownership have found mixed results.[16]

4. Implications for the staff forecast and uncertainty around our outlook

Because we think that the rise in mortgage rates can account for at least part of the weakness in housing activity over the past year, we expect growth in residential investment to pick up over the second half of 2014 as this drag fades.[17] The latest incoming data seem consistent with the notion that housing activity has begun to firm. Closed sales of existing homes rose in April and May, and a jump in signed contracts in May points to further increases in closed transactions going forward. As for construction activity, single-family permits—which we view as a better gauge of the underlying pace of construction than starts—stepped up in May and June.

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[13] A number of analysts have found that weak labor market conditions, including income and unemployment, increase cohabitation with parents, reduce fertility, or otherwise decrease the formation of new households (Kaplan 2012, Lee and Painter 2013, Paciorek forthcoming, Sommer 2014). Indeed, between 2005 and 2013, the fraction of young adults residing with parents rose appreciably (Dettling and Hsu 2014).
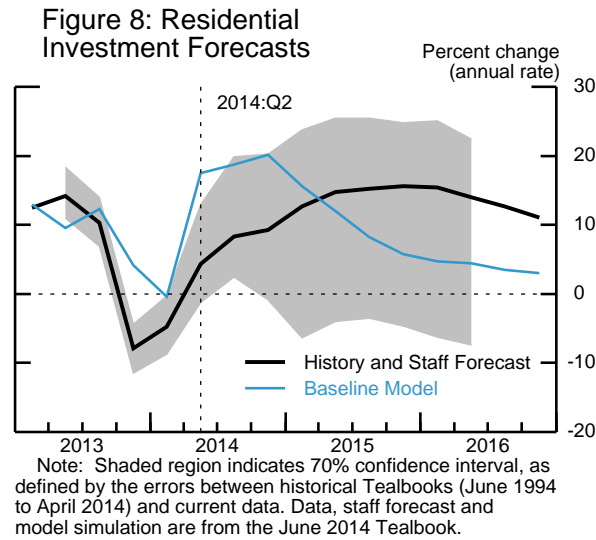
[14] Moreover, the rising incidence of student loan delinquencies could have long-lasting effects on credit records because student loans cannot be discharged in bankruptcy.

[15] See Fannie Mae's National Housing Survey and a survey of Rutgers University graduates (Stone, Horn and Zukin 2012).

[16] Some studies find that student loans reduce homeownership among young households (Brown and Caldwell 2013, Houle and Berger 2013), but others do not (Akers 2014).

[17] Any model where the *level* of mortgage rates affects the *level* of activity—regardless of the precise specification used—suggests that changes in mortgage rates should have only a temporary effect on *changes* in activity.

Our baseline model predicts that growth in investment will rise smartly in the second half of this year and then slow in 2015 and 2016 (see Figure 8).[18] By contrast, the staff forecast calls for robust growth in residential investment in 2015 and 2016 because we anticipate a waning of several headwinds in the sector that are not well captured by the model.

Figure 8: Residential Investment Forecasts

Percent change (annual rate)

Note: Shaded region indicates 70% confidence interval, as defined by the errors between historical Tealbooks (June 1994 to April 2014) and current data. Data, staff forecast and model simulation are from the June 2014 Tealbook.

First, we expect that any drag from supply constraints in the residential construction sector ought to ease as resources begin flowing back into the sector. In the 10 years prior to the housing boom, new construction averaged nearly twice its current level, so a higher level of construction seems plausible.

Second, we expect the factors weighing on household formation to ease over time. Figure 9 illustrates the magnitude of the effect that this could have on new construction by plotting the level of new construction along with the number of housing units that would be needed to keep pace with population growth, assuming that household size remains unchanged and that housing demolition continues at its average pace of the past 50 years—the horizontal line in the figure.[19] Allowing for trend increases in second homes or a decline of household size to its long-run average would only raise the required level of construction. The model does not incorporate any measure of the number of housing units

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[18] This deceleration in the model simulation largely owes to our projection for mortgage rates to rise and house prices to decelerate.

[19] In particular, the Census Bureau predicts that the population will rise by roughly 2.2 million adults per year in the next 10 years. With 1.9 adults per household in 2013, a flat trajectory of household size suggests that we will need roughly 1.2 million housing units per year to satisfy population growth alone. Adding in the average rate of housing unit loss over the past fifty years gives a total of 1½ million units needed to satisfy population growth and demolition.

needed to accommodate the population, so it is not sensitive to this positive influence.

Figure 9: New Construction and Long-Run Demand

Millions of units (annual rate)
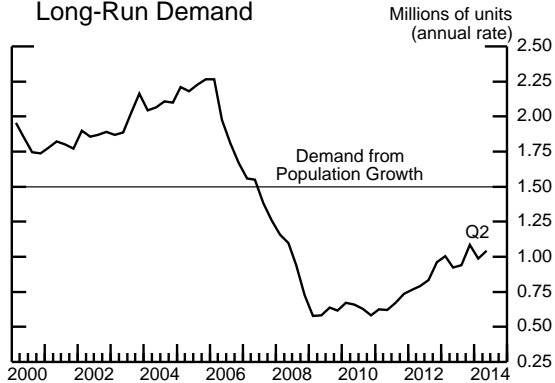
Note: Sum of single-family starts, multifamily starts, and mobile home shipments. Horizontal line shows the amount of construction needed to satisfy population growth assuming household size remains constant at its 2013 level and demolition continues at its 50-year average. Estimate for 2014:q2 assumes that mobile home shipments in May and June are the same as in April.

Figure 10: Contributions to Growth in the Residential Investment Model

Percent change (annual rate)
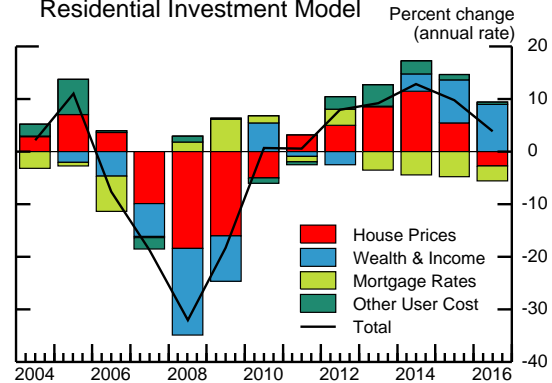
Third, we expect mortgage credit conditions—which are also not well captured by our models—to ease somewhat over time. For example, the end of the refinancing wave in the wake of last year's rise in rates seems to have prompted lenders to extend credit to borrowers with slightly lower credit scores.[20] In addition, we expect unease about put-back risk to fade and uncertainty about regulations in the mortgage market to diminish.

As with all projections, there is considerable uncertainty around our forecast for residential investment. Figure 8 includes a 70 percent confidence band around the staff forecast that is calculated from the distribution of staff forecast errors from 1993 to 2012.[21] In the next few quarters the confidence interval is relatively narrow because housing starts give a strong signal for new construction expenditures over the subsequent six months. However, the confidence interval widens substantially over time, encompassing growth of more than 20 percent and declines of 5 percent by the end of 2015.

Among the many uncertainties ahead, one area worth highlighting is that housing activity appears to be strongly influenced by house price expectations. As shown in Figure 10, in our residential investment model changes in house prices account

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[20] Of course, recent declines in mortgage rates—if continued—could affect refinancing activity going forward. In particular, some market contacts noted that an additional decrease in rates of about 25 basis points could trigger a new wave of refinancing activity.

[21] The errors are calculated by comparing the Tealbook forecasts to residential investment as currently published.

for a substantial portion of the housing market boom and bust, as well as for the rise in investment in 2012 and the first half of 2013. Because we expect house prices to decelerate over the projection period, the contribution of house prices shrinks and becomes a net drag on investment in 2016. But expectations are extremely difficult to predict and can change quickly.

5. Conclusion

The sharp rise in mortgage rates that occurred in mid-2013 led us to expect a modest deceleration in home sales and construction activity, but the deceleration that occurred turned out to be much larger and more persistent than we projected. In our view, the most plausible explanations for this surprise are related to (a) factors that made the effect of a rise in mortgage rates larger and more persistent than would be suggested by historical experience, (b) a decrease in the inventory of distressed property for sale and (c) an intensification of supply constraints in the residential construction industry.

Going forward, we expect activity to resume rising at roughly the same pace as seen in 2012 and the first half of 2013, fueled by continued improvement in labor market conditions, population growth, and a modest easing of mortgage credit conditions. However, our forecast is highly uncertain. Not only could factors restraining activity be more persistent than we currently expect, but we could be wrong about the reason for the deceleration. On the other hand, there is also considerable upside risk to our projection. With new construction in the first half of this year 30 percent below the level needed to satisfy population growth and depreciation alone, it seems clear that construction should eventually move up.

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