

## Discussion of “Explaining House Price Dynamics: Isolating the Role of Non-Fundamentals”

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### Overview

The paper by Ling, Ooi, and Le (this issue) investigates the degree to which U.S. real house prices were driven by non-fundamental factors over the period 1990 to 2010. Three measures of housing market sentiment from surveys (buyer, lender, and builder) are regressed on a comprehensive set of fundamental variables (population growth, real GDP growth, real income growth, real rent growth, unemployment, the real mortgage interest rate, and the change in new housing supply). Residuals from these regressions represent the non-fundamental measures of sentiment. There are three basic findings:

- (1) Non-fundamental measures of sentiment help to predict future real house price changes and future non-fundamental measures of sentiment. This result can be interpreted as evidence of bubble-like behavior, i.e., non-fundamental house price dynamics.
- (2) Past real house price changes help to predict future real house price changes even after taking into account the non-fundamental measures of sentiment and every conceivable fundamental variable that the theory says should matter. This result can be interpreted as evidence that U.S. housing market participants employ some type of backward-looking, extrapolative, or moving-average forecast rule.
- (3) Past real house price changes help to predict future non-fundamental measures of sentiment. This result, together with result (1), can be interpreted as evidence of a self-reinforcing feedback loop between real house price changes and non-fundamental measures of sentiment.

The use of survey data from three different sources and the strategy of orthogonalizing the survey responses from movements in fundamentals are both novel approaches. In a nutshell, the paper provides strong empirical support for Robert Shiller’s simple and intuitive feedback model of asset price bubbles (Shiller 2005). If asset prices start to rise, the success of some investors attracts public attention and fuels the spread of enthusiasm for the market. New and often less sophisticated investors enter the market and bid up prices, often using borrowed money. This “irrational exuberance” heightens expectations of further price increases, as investors optimistically extrapolate recent price action into the future. Seemingly-plausible fundamental arguments are used to explain the dramatic rise in asset prices. The market’s meteoric rise is typically justified in the popular culture by some “new era” theory that involves the introduction

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of new technology, i.e., “This time is different.” But the bubble carries the seeds of its own destruction; if prices begin to sag, pessimism can take hold, causing some investors to exit the market. Downward price motion begets expectations of further downward motion, and so on, until a bottom is eventually reached.

The Fed’s Flow of Funds data shows that the ratio of U.S. household real estate value to personal disposable income started rising in 1997.Q1 from a value around its long-run mean. The ratio increased by 60 percent over the next nine years, peaking in 2005.Q4. Over the next six years, the ratio fell back to its long-run mean, finally hitting bottom around 2011.Q4. It’s worth thinking about this boom-bust cycle in the context of Shiller’s feedback model and the empirical evidence presented by Ling, Ooi, and Le. The data shows that U.S. house prices had been rising faster than income for several years prior to the advent of the toxic mortgages that have often been blamed for causing the bubble. The house price appreciation of the late 1990s generated the initial enthusiasm for the market that captured peoples’ attention and fueled a growing optimism among buyers, builders, and lenders. The initial enthusiasm was reinforced when house prices continued upward even after stock prices began a protracted decline in March 2000. The Fed’s aggressive easing of monetary policy from 2001 to 2004 coincided with a decline in mortgage interest rates, providing a seemingly-plausible fundamental justification for the dramatic increase in house prices.

Heading into the mid-2000s, the steady rise in house prices encouraged lenders to ease credit standards on the assumption that house prices would continue to rise. Mortgage delinquency rates kept falling even as houses became more expensive relative to income. Falling delinquency rates provided a justification for easing credit standards even further. To keep monthly payments affordable, lenders marketed a range of exotic mortgage products, e.g., loans requiring no down payment or documentation of income, monthly payments for interest-only or less, and adjustable rate mortgages with low introductory “teaser” rates that reset higher over time. These mortgage products paradoxically harmed affordability by opening the door to a flood of new homebuyers who bid up prices even further. House prices rose faster in areas where subprime and exotic mortgages were more prevalent (Mian and Sufi 2009, Pavlov and Wachter 2011). In a given area, past house price appreciation had a significant positive influence on subsequent loan approval rates in the same area (Dell’Ariccia, Igan, and Laeven 2012, Goetzmann, Peng, and Yen 2012). Commenting on the rapid growth in subprime mortgage lending, Fed Chairman Alan Greenspan (2005) offered the view that the lending industry had been dramatically transformed by advances in information technology: “Where once more-marginal applicants would simply have been denied credit, lenders are now able to quite efficiently judge the risk posed by individual applicants and to price that risk appropriately.” This optimistic belief in a “new era” of credit risk modeling fits perfectly with Shiller’s framework.

During the boom years, many economists and policymakers argued that a housing bubble did not exist and that numerous fundamental factors were driving the run-up in U.S. house prices.<sup>2</sup> In a July 1, 2005 interview on the CNBC network, Ben Bernanke, then Chairman of the President’s Council of Economic Advisers, asserted that strong growth in jobs and incomes, low mortgage rates, demographics, and restricted supply were supporting U.S. house prices. In the same

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<sup>2</sup>See, for example, McCarthy and Peach (2004) and Himmelberg, Mayer, and Sinai (2005).

interview, Bernanke stated his view that a substantial nationwide decline in house prices was “a pretty unlikely possibility.” With the benefit of hindsight and lot more data, the empirical evidence presented by Ling, Ooi, and Le shows that the rise in U.S. house prices during this period was in fact linked to forces that were completely orthogonal to fundamentals.

### **Lessons for Economic Models**

Standard economic models with fully-rational expectations have difficulty producing large swings in house prices that resemble the patterns observed in many countries over the past two decades. It is common for such models to include extremely large and persistent exogenous shocks to rational agents’ preferences for housing in an effort to bridge the gap between the model and the data (Iacoviello and Neri 2010). Leaving aside questions about where these shocks come from and how agents’ responses to them could become coordinated, a positive housing preference shock would increase the housing service flow, as measured by the imputed rent. Consequently, a boom-bust cycle driven by large housing preference shocks would imply a boom-bust cycle in the ratio of housing rent-to-income. But this did not happen in the data.

Declines in the collateral value of an asset are often modeled as being driven by fundamental shocks to the “quality” of the asset, rather than the result of a burst asset price bubble (Gertler, Kiyotaki, and Queralto 2012). Taken literally, this setup would imply that the decline in U.S. house prices since 2005:Q4 was caused by something akin to a nationwide infestation of wood termites. Time-varying risk premiums (for example due to habit formation) is another modeling device that is often used to generate large swings in asset prices under rational expectations (Campbell and Cochrane 1999). The problem here is that a sustained run-up in asset prices caused by decline in rational risk premiums would cause the rational investor to expect low future returns going forward. This prediction is completely at odds with a wide variety of survey evidence from both real estate and stock markets which shows that real-world investors typically expect high future returns after sustained asset price run-ups (Case, Shiller, and Thompson 2012, Greenwood and Shleifer 2013).

As an alternative to rational expectations, models in which agents employ simple moving-average forecast rules with exponentially-declining weights on past data can generate large swings in asset prices without the need for implausible fundamental shocks.<sup>3</sup> A moving-average forecast rule has the following virtues: (1) it requires only a minimal amount of computational and informational resources, (2) it is consistent with the empirical findings of Ling, Ooi, and Le who show that past price changes help to predict future price changes, (3) it implies that investors will tend to expect high future returns after a sustained price run-up, and (4) it provides a very good fit of the survey expectations data which are characterized by a delayed response to macroeconomic news (Coibion and Gorodnichenko 2012).

### **Lessons for Policy**

History tells us that episodes of booming asset prices, high levels of investment, and sustained rapid credit expansion are almost always followed by periods of stress in the financial system

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<sup>3</sup>See, for example, Gelain, Lansing, and Mendicino (2013) and Gelain and Lansing (2014).

(Borio and Lowe 2002). A recent cross-country empirical study by Jordà, Schularick, and Taylor (2014) concludes that “Mortgage booms are an important source of financial instability in the post-WWII era.” The extensive harm caused by the burst U.S. housing bubble raises the question of whether policymakers could have done more to prevent the buildup of dangerous imbalances in the household sector. The mainstream view prior to the crisis was that central banks should not attempt to prick a suspected bubble but instead should follow a “strategy of addressing the bubble’s consequences rather than the bubble itself” (Greenspan 2004a). In the aftermath of the crisis, a different view has emerged: “What has become patently obvious is that not dealing with certain kinds of bubbles before they get big can have grave consequences. This lends more weight to arguments in favor of attempting to mitigate bubbles, especially when a credit boom is the driving factor” (Yellen 2009).

One view is that a two-tiered approach involving both macroprudential policy (first line of defense) and interest rate policy (second line of defense) is the best way to prevent credit-fueled bubbles. A two-tiered approach may be needed because macroprudential regulations can be unwound over time and may not always work. For example, a standard macroprudential prescription is to impose upper limits on loan-to-value ratios. But during the U.S. housing boom, aggregate loan-to-value ratios did not signal any significant increase in household leverage because real estate values rose together with mortgage debt in a self-reinforcing feedback loop. Only after the collapse in house prices did loan-to-value ratios provide an indication of excessive household leverage. But by then, the over-accumulation of household debt had already occurred. In a February 2004 speech, Fed Chairman Alan Greenspan (2004b) remarked “Overall, the household sector seems to be in good shape, and much of the apparent increase in the household sector’s debt ratios over the past decade reflects factors that do not suggest increasing household financial stress.” Similarly, in an April 2004 speech, Fed Governor Donald Kohn (2004) stated “And, while [household] debt has been increasing, assets on household balance sheets have been rising even more rapidly. Barring a collapse in house or equity prices...household net worth should remain comfortably above the levels of a few years ago.”

A debt-to-income limit represents a more prudent lending criterion than a loan-to-value limit because income, unlike asset value, is less subject to bubble-induced distortions. The ratio of U.S. household mortgage debt to disposable personal income started to rise rapidly around 2001--about five years before the peak of the bubble---thus providing regulators with an early warning signal of a potentially dangerous buildup of household leverage. Unfortunately, the signal was not heeded. A cross-country study by Lim, et al. (2011), p. 53 finds that debt-to-income limits are more effective than loan-to-value limits in reducing the growth rates of real estate prices and credit. As the U.S. housing boom progressed, lenders placed less emphasis on borrowers’ incomes and more emphasis on expected future house prices. So-called “no-doc” and “low-doc” loans became increasingly popular. Loans were approved that could only perform if house prices continued to rise, allowing borrowers to refinance. In retrospect, it seems likely that stricter adherence to prudent debt-to-income limits could have forestalled much of the housing boom, such that the subsequent bust and the resulting financial turmoil would have been less severe.

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