European Economic Review 70 (2014) 419–437

Contents lists available at ScienceDirect

European Economic Review

journal homepage: www.elsevier.com/locate/eer

A model of housing and credit cycles with imperfect market knowledge

Pei Kuang *

JG Smith Building, Department of Economics, University of Birmingham, B152TT, UK

ARTICLE INFO

Article history:
Received 11 January 2013
Accepted 24 June 2014
Available online 7 July 2014

JEL classification:
D83
D84
E32
E44

Keywords:
Boom-bust
Collateral constraints
Learning
Leverage
Housing

ABSTRACT

The paper presents a model of housing and credit cycles featuring distorted beliefs and comovement and mutual reinforcement between house price expectations and price developments via credit expansion/contraction. Positive (negative) development in house prices fuels optimism (pessimism) and credit expansion (contraction), which in turn boost (dampen) housing demand and house prices and reinforce agents' optimism (pessimism). Bayesian learning about house prices can endogenously generate self-reinforcing booms and busts in house prices and significantly strengthen the role of collateral constraints in aggregate fluctuations. The model can quantitatively account for the 2001–2008 U.S. boom-bust cycle in house prices and associated household debt and consumption dynamics. It also demonstrates that allowing for imperfect knowledge of agents, a higher leveraged economy is more prone to self-reinforcing fluctuations.

> "At some point, both lenders and borrowers became convinced that house prices would only go up. Borrowers chose, and were extended, mortgages that they could not be expected to service in the longer term. They were provided these loans on the expectation that accumulating home equity would soon allow refinancing into more sustainable mortgages. For a time, rising house prices became a self-fulfilling prophecy, but ultimately, further appreciation could not be sustained and house prices collapsed." (Bernanke (2010))

1. Introduction

The recent decade has witnessed a massive run-up and subsequent collapse of house prices, as well as the remarkable role of the interaction of housing markets and credit markets in aggregate fluctuations in the U.S. economy. Real house prices increased considerably in the decade before the recent financial crisis, as seen in the upper panel of Fig. 1.[1] They displayed relatively smaller variability before the year 2000 and increased by 35.9% from 2001 to 2006 in which house prices peaked. Associated with the price boom was a sharp increase in the household credit market debt/GDP ratio[2] and a consumption boom. As can be seen from

* Tel.: +44 121 4145620.
E-mail address: P.Kuang@bham.ac.uk

[1] The data is taken from the OECD. Its definition is the "national wide single family house price index". The real house price index is the nominal house price index deflated by CPI price index. It is normalized to a value of 100 in 2000. The price-to-rent ratio and price-to-income ratio display a similar pattern.

[2] The household credit market debt/GDP ratio is measured by the absolute value of the ratio of net credit market assets of U.S. household and non-profit organizations to GDP. The data is from the Flow of Funds Accounts of the U.S. provided by the Board of Governors of the Federal Reserve System.

http://dx.doi.org/10.1016/j.euroecorev.2014.06.013
0014-2921/

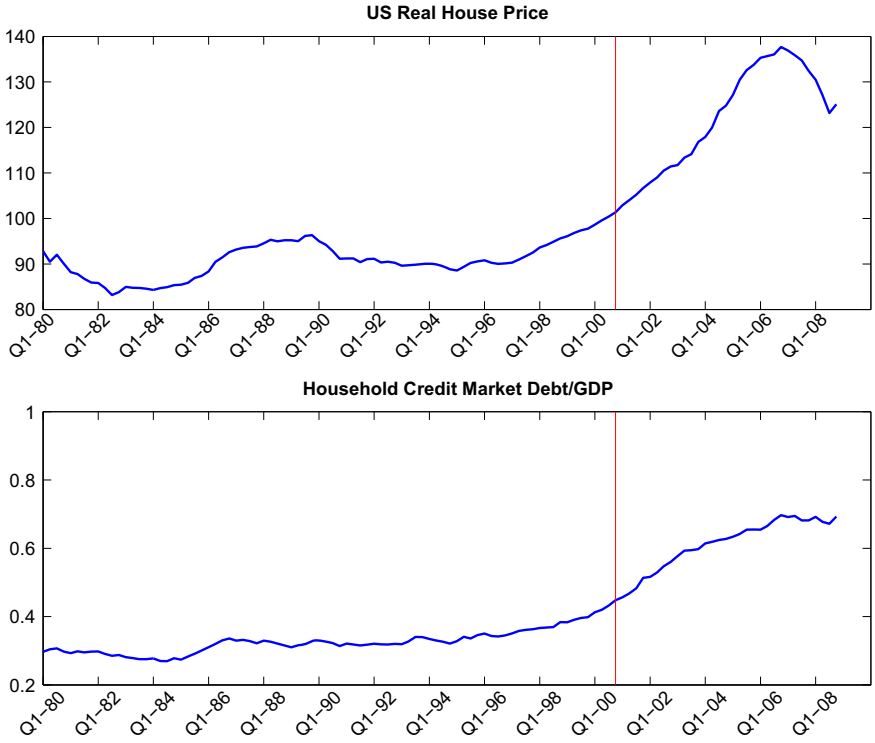

Fig. 1. US real house prices and household credit market debt/GDP.

the lower panel of Fig. 1, the household credit market debt/GDP ratio changed moderately before the year 2000 but increased from 45% in 2001 to 70% in 2006. Aggregate consumption[3] grew at about 3% per annum between 2001 and 2006, while its growth dropped sharply after house prices started to revert, as shown in Fig. 2.

A number of recent research document over-optimistic expectations about the future path of house prices and the comovement between the expectations and house price developments during the housing boom preceded the financial crisis. Cheng et al. (2014) study personal home transaction data of the mid-level Wall Street managers in securitized finance both on the buy and sell side, which is supposed to reveal their beliefs about the path of house prices. They document that the securitization agents held over-optimistic beliefs about future house prices and call for serious considerations of the role of beliefs in the financial crisis and the macroeconomic implications of their belief dynamics. Case et al. (2012) document over-optimistic expectations of home buyers using the Case–Shiller home buyer survey implemented at four metropolitan areas of the U.S. Based on the data from Michigan Survey of Consumers, Piazzesi and Schneider (2009) find that the "optimism" in the housing markets, i.e., the share of agents believing prices to increase further co-moved positively with the house price level and peaked exactly when house prices reached its peak.

Deriving house price forecasts from the future markets for the Case–Shiller house price index (where only the data from 2006 onwards are available), Gelain et al. (2013) find the comovement and mutual reinforcement between agents' pessimistic price beliefs and price realizations during the house price reversal, in particular, "the future market tends to overpredict future house prices when prices are falling" and persistent one-sided forecast errors.

The paper develops a model of housing and credit cycles with a housing collateral constraint à la Kiyotaki and Moore (1997, henceforth KM) but incorporating an explicit role for subjective beliefs consistent with the evidence in the work mentioned earlier. The model can quantitatively account for the 2001–2008 U.S. boom-bust cycle in house prices and associated debt and consumption dynamics following the strong fall in real interest rates after the year 2000.

In the model agents know their own objective, constraints and beliefs but have imperfect knowledge about the macroeconomy, such as other agents' preferences and prices beliefs unlike in the standard Rational Expectations (RE) modeling. Relaxing such informational assumption leads to agents' uncertainty about the equilibrium mapping between fundamentals (e.g. preference shocks, house holdings) of the economy and house prices, which is similar to that economists appear to be uncertain about the right model governing house prices. Following Adam and Marcet (2011), agents are assumed to be "Internally Rational," i.e., making optimal decisions under a completely specified and dynamically consistent subjective belief system about all payoff-relevant variables, including house prices. Internally rational agents do not understand how market prices are formed, so their subjective price beliefs need not be exactly the same as the objective

[3] The data is from Federal Reserve System. It is the Real Personal Consumption Expenditures (series ID: PCECC96).