Economic Modelling 32 (2013) 172–178

Contents lists available at SciVerse ScienceDirect

Economic Modelling

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

House price dynamics and their reaction to macroeconomic changes

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ARTICLE INFO

Article history:
Accepted 5 February 2013

JEL classification:
G12
R31

Keywords:
House prices
Monetary policy
Markov switching model
Macroeconomic drivers

ABSTRACT

This article applies a three-regime Markov switching model to investigate the impact of the macroeconomy on the dynamics of the residential real estate market in the US. Focusing on the period between 1960 and 2011, the methodology implemented allows for a clearer understanding of the drivers of the real estate market in "boom", "steady-state" and "crash" regimes. Our results show that the sensitivity of the real estate market to economic changes is regime-dependent. The paper then proceeds to examine whether policymakers are able to influence a regime switch away from the crash regime. We find that a decrease in interest rate spreads could be an effective catalyst to precipitate such a change of state.

1. Introduction

Over the last few decades, residential property markets in many industrialised nations across the globe have witnessed large cyclical variations in prices and volumes. Real estate cycles are often characterised by a surge in prices followed by a fall or crash. An example of this was seen in the UK housing market in the late 1980s. Financial liberalisation in the UK led to a price boom, but following an increase in interest rates, residential prices experienced a sharp decline in the early 1990s. More recently in the US, nationwide property prices grew by over 61% between 2000 and 2005 but fell sharply by 38% in the four years that followed. There are similar examples in other countries including Japan, Ireland and Spain. These cycles are often linked with changes in macroeconomic drivers such as interest rates and economic growth.

This cyclical nature of the residential real estate market has been a major topic of discussion over the years mainly because a large proportion of the average household's wealth is invested in property. The housing market in the US accounts for more than 50% of the country's fixed capital stock (Baffoe-Bonnie, 1998). Economic theory suggests that wealth is one of the key drivers of aggregate consumption in any economy, and so therefore, a downturn in the housing market is likely to be followed by a decrease in household consumption levels, which may in turn have adverse effects on the growth rate of an economy. Empirical evidence of this is shown in Case et al. (2001), who use a panel of 14 countries in their study to present statistical evidence that a 10% rise in housing wealth would lead to a 1.1% increase in consumption.

The behaviour of the residential real estate market is also important because of the impact of house price falls on the lending portfolios of commercial banks and other financial institutions. Wheelock (2006) shows that a period of large declines in house prices is very often followed by an increase in the rate of mortgage defaults, which has an adverse effect on banks' profits. The reduction in profitability may lead to failures in banks and other real estate lenders and a subsequent slowdown in economic activity. A recent high profile example of this was the collapse of Lehman Brothers which was heavily exposed to the real estate market via mortgage backed securities. Following the failure of Lehmans in September 2008, the CBOE Volatility Index (VIX), often referred to as the "fear index", jumped 70%,[1] and a global recession followed shortly thereafter. In their empirical study, Ghent and Owyang (2010) provide evidence that house price changes drive business cycles. Thus, given the potentially detrimental effects of declining housing prices on the economy, a deeper understanding of the economic drivers of the residential real estate market is required.

The purpose of this paper is to investigate how changes in key macroeconomic variables could influence the growth in house prices, depending on which part of the cycle the real estate market is in. This study examines the impact of macroeconomic drivers of real estate price changes in a three-regime-switching context, thus providing information on how selected economic factors influence price changes in the residential real estate market depending on whether the housing market is a "boom", "steady-state" or "crash" regime. The paper

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[1] Whaley (2000) concludes that the VIX index is a gauge for investors' fears as it provides an aggregate view of their expectations of volatility in the stock market.

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http://dx.doi.org/10.1016/j.econmod.2013.02.007

further contributes to the existing literature by investigating the likelihood of monetary policy tools precipitating a switch from a crash regime.

Most prior studies on this topic do not allow for significant structural breaks in house prices resulting from huge upswings and collapses in prices, instead assuming that the relationship between house prices and economic variables is stable and consistent. The sensitivity of house prices to changes in these variables could, however, depend on the stage in the housing cycle. Failing to account specifically for volatile periods such as the period between 2000 and 2012 in the US housing market could produce results which may not reflect a true picture of the relationship between macro factors and growth in house prices. Xiao (2007) and Nneji et al. (forthcoming), studying the residential property market in Hong Kong and the US respectively, provide evidence that structural breaks in real estate prices caused by speculative bubbles are likely to disconnect the housing market from the cost of renting. As a result, the relationship between the housing market and its macroeconomic determinants may be regime-varying, and so accounting for the housing market cycle is critical when examining its response to external macroeconomic factors. We seek to address several policy-relevant questions in this research. First, is the housing market more sensitive to economic changes in boom or bust periods? Second, which economic factor(s) has(have) the strongest impact on the housing market in each regime or cycle? Third, is it possible for policymakers to influence a switch away from the "bust" state (typically characterised by negative growth) using monetary policy tools?

Studying the US housing market between 1960 and 2011, we apply a three state Markov switching model to examine the possibility that macroeconomic drivers of house price changes are regime-specific. The regime-switching methodology implemented in this paper also enables us to identify cycles in the housing market. We can then evaluate whether policymakers are able to switch the housing market from a crash regime to a steady state simply by using monetary policy tools. To our knowledge, this is the first study that applies a three Markov switching model in the context of the relationship between the real estate market and the macroeconomy, and the first study that examines the efficacy of policy tools for causing a switch away from the "crash" regime.

The layout of the rest of the paper is as follows. Section 2 is dedicated to reviewing the existing literature on the relationship between economic variables and the residential real estate market. The following section, Section 3, provides descriptive statistics for the data used in the paper. In Section 4 a more detailed explanation of the methodologies implemented is given. Section 5 interprets and discusses the results from the Markov switching regressions, and in Section 6 we examine the power of monetary policy tools in influencing a switch in the housing market from a crash regime. We conclude in Section 7.

2. Literature review

The literature on the macroeconomic determinants of house prices is vast. For many years, especially before the subprime mortgage market crisis of the late 2000s, researchers used linear models to examine the relationship between the macroeconomy and the dynamics of house prices. These papers have generally applied regression analyses to evaluate how growth in real estate prices is being driven by economic factors including interest rates, inflation, the unemployment rate, and economic growth.

The majority of these papers identify interest rates as the most important explanatory variable. One early study is Abraham and Hendershott (1992). Using pooled cross-sectional data on metropolitan house prices in the US between 1977 and 1991, they find that macroeconomic factors including interest rates and employment are significant in influencing house prices. Iacoviello and Minetti (2003) argue that, over time, house prices became more sensitive to interest rate changes due to financial liberalisation in European countries including the UK. More recently, this sentiment is shared by Himmelberg et al. (2005), who show the importance of interest rates to house price changes. The authors also find that the sensitivity of house prices to long-term interest rates intensifies when rates had been relatively low in the recent past. Furthermore, they cite that house prices are even more sensitive to long-term interest rates in cities where values grow relatively faster. Adams and Füss (2010) distinguish the impact of short term from long term interest rates on real estate price dynamics. They argue that short term interest rates adversely affect demand for houses mainly because of the effect on mortgage rates and the cost of financing for construction firms. Holly and Jones (1997), McQuinn and O'Reilly (2008) and Bouchouicha and Ftiti (2012) have also investigated the link between the real estate market and interest rates.

Other papers have established that price dynamics in the real estate market may be influenced by macroeconomic factors other than interest rates. For example, Lastrapes (2002), using a vector autoregressive model, attributes short run increases in house prices to positive money shocks. Brunnermeier and Julliard (2008) conclude that inflation, not real interest rate changes, influences the price–rent ratio as it is a signal of a likely future downturn in the economy. Investigating the linkage between macroeconomic fluctuations and international house prices, Beltratti and Morana (2009) estimate that 40% of the variation in house prices in G-7 countries is caused by global macroeconomic shocks. The study by Adams and Füss (2010) provides evidence that variables linked with economic activity such as industrial production, the level of unemployment and money supply influence demand for housing and house price. Other papers that study the macroeconomy–housing relationship on an international scale include Englund and Ioannides (1997), Tsatsaronis and Zhu (2004) and Glindro et al. (2011).

As discussed above, only a handful of studies have accounted for the housing cycle when examining the relationship between house prices and the macroeconomy. A notable exception is the research by Hall et al. (1997), who use a two-regime switching error–correction approach to develop a macroeconomic model for UK house prices which accounts for booms and busts. Their paper uses a Markov regime-switching approach, assuming that there are only two distinct regimes in the housing market — "boom" and "bust". The present paper adds a third regime which we call "steady-state" based on the premise that the US housing market may have been in a dormant state where prices are growing at a small steady rate. In this state, the housing market is neither booming nor declining in prices. This can be observed in the early 1990s where nominal house prices grew by an average of just 3% per annum in contrast to the early 2000s boom of 11% annual growth and the late 2000s bust which saw prices decline by an average of 6% per year. Furthermore, this study builds on the work by Hall et al. as we model the government's ability to affect a regime shift, which thus has policy implications.

3. Data

The data employed in this study consist of sets of 203 quarterly observations from 1960Q1 to 2011Q3. For residential property market prices, the data are supplied by the Lincoln Institute of Land Policy, constructed using the methodology of Davis et al. (2008). In order to compute this series, Davis et al. use interpolation procedures to adjust the quarterly changes in the Freddie Mac Conventional Mortgage House Price Index (CMHPI) in order to connect the series with the Decennial Census of Housing benchmark levels. The price series used in this study is adjusted for inflation.

In this paper, we employ inflation, disposable income growth, the short rate and the term structure of interest rates (also referred to as the yield curve or interest rate spread) as key economic variables that influence housing demand. These variables have been selected