Economic Modelling 32 (2013) 161–171

Contents lists available at SciVerse ScienceDirect

Economic Modelling

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

Is the relationship between monetary policy and house prices asymmetric across bull and bear markets in South Africa? Evidence from a Markov-switching vector autoregressive model ☆

Beatrice D. Simo-Kengne [a], Mehmet Balcilar [b], Rangan Gupta [a,*], Monique Reid [c], Goodness C. Aye [a]

[a] Department of Economics, University of Pretoria, Pretoria, South Africa
[b] Department of Economics, Eastern Mediterranean University, Famagusta, Turkish Republic of Northern Cyprus, via Mersin 10, Turkey
[c] Department of Economics, Stellenbosch University, Stellenbosch, South Africa

ARTICLE INFO

Article history:
Accepted 5 February 2013

JEL classification:
C22
C32
E52
R31

Keywords:
Monetary policy
House prices
Regime switching

ABSTRACT

This paper examines asymmetries in the impact of monetary policy on the middle segment of the South African housing market from 1966:M2 to 2011:M12. We use Markov-switching vector autoregressive (MS-VAR) model in which parameters change according to the phase of the housing cycle. The results suggest that monetary policy is not neutral as house price growth decreases substantially with a contractionary monetary policy. We find that the impact of monetary policy is larger in bear regime than in bull regime; indicating the role of information asymmetry in reinforcing the financial constraint of economic agents. As expected, monetary policy reaction to a positive house price shock is found to be stronger in the bull regime. This suggests that the central bank reacts more in bull regime in order to prevent potential crisis related to the subsequent bust in house prices bubbles which are more prominent in bull markets. These results substantiate important asymmetries in the dynamics of house prices in relation to monetary policy, vindicating the advantages of generating regime dependent impulse response functions.

1. Introduction

The recent global economic downturn attributed to the sub-prime crisis in the US with rapid contagion worldwide has attracted the attention of academics and policymakers of both developed and developing countries, and South Africa is no exception. As observed during the "Great Recession", the bursting of the house price bubble is generally followed by significant contractions in the real economy.[1] Over the last two decades, South Africa has witnessed a rapid appreciation in home values which has been shown to have affected the real economy, through consumption, at both aggregate and provincial levels (Das et al., 2011; Ncube and Ndou, 2011; Peretti et al., forthcoming; Simo-Kengne et al., 2012, forthcoming).[2] Furthermore, Gupta and Hartley (forthcoming) point out that house price in South Africa, is a leading indicator for output and inflation, and hence, can provide important information as to where the real economy is heading. Given this, it is crucial for central banks to analyze thoroughly the effects of monetary policy on asset prices in general and real estate in particular, which in turn, would lead to the understanding of the effects of monetary policy on the economy at large.[3]

Against this backdrop, the main objective of this paper is not only to analyze the impact of interest rate on South African house prices, but also, to check if the effect is asymmetric depending on whether the housing market is in a bull or bear regime. Intuitively, an increase in the interest rates tends to increase the user cost of capital which translates into a decrease in housing activity and consequently a fall in real estate prices (Demary, 2010). Furthermore, the class of models

☆ We would like to thank two anonymous referees for many helpful comments that improved the quality of the paper. Any remaining errors are, however, solely ours.
* Corresponding author.
E-mail addresses: beatrice.simo_kengne@up.ac.za (B.D. Simo-Kengne), mehmet@mbalcilar.net (M. Balcilar), rangan.gupta@up.ac.za (R. Gupta), mreid@sun.ac.za (M. Reid), goodness.aye@up.ac.za (G.C. Aye).

[1] Recently, Leamer (2007) strongly argues that housing *is* the business cycle, indicating "any attempt to control the business cycle needs to focus especially on residential investment." (p. 150). His main point relates to the dynamics of the construction of homes. To wit, a building boom over one time interval pushes the stock of new homes above trend and that necessitates with some lag another time interval with a building slump. Thus, monetary policy should focus on preventing booms from occurring to head off the eventual slump. Smets (2007) provides commentary on Leamer's (2007) paper and argues that interest rates (and monetary policy) crucially determine the linkages between the housing cycle and the business cycle. Leamer (2007) responds that "in the context of my paper, the interest rate spread has its impact though housing, though it surely operates through other channels." (p. 249).

[2] For a detailed international literature review on the impact of house prices on the real economy, the reader is referred to Andre et al. (2011), Peretti et al. (forthcoming), and Simo-Kengne et al. (forthcoming).

[3] For a detailed international literature review on the impact of interest rate on house prices, the reader is referred to Vargas-Silva (2008), Gupta and Kabundi (2010), Gupta et al. (2012a, 2012b).

0264-9993/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.econmod.2013.02.006

developed by Bernamke and Gertler (1989) and Kiyotaki and Moore (1997), in which there exist agency costs of financial intermediation (finance constraint) asserts that when there is information asymmetry in the financial market, agents may behave as if they were constrained financially. Moreover, the financial constraint is more likely to bind in bear markets. Hence, a monetary policy may have greater effects in bear markets. Furthermore, recent studies by Ncube and Ndou (2011), Peretti et al. (forthcoming), Simo-Kengne et al. (forthcoming), highlight that the South African Reserve Bank (SARB) has systematically reacted to house price movements.[4] Given the possibility of a feedback of house prices onto the interest rate setting behavior of the SARB, we use a Markov-switching vector autoregressive (MS-VAR) model comprising the interest rate and house price, rather than the standard Markov switching regressions popularly used when analyzing the impact of monetary policy on asset returns (mainly stock returns),[5] which in turn, assumes exogeneity of the monetary policy instrument.[6] On one hand, the MS structure allows us to characterize the time series dynamics in different states, and on the other hand, the VAR structure allows for possible endogeneity in the relationship between monetary policy and house prices. To the best of our knowledge, the study by Chang et al. (2011) is the only other existing study that has utilized the MS-VAR approach to analyze the impact of monetary policy on housing returns (besides equity real estate investment trusts and stock returns) for the US. Though this paper does not provide a clear identification of the housing cycle in terms of bull and bear markets, the authors indicate that, following an innovation in Federal Funds rate, housing returns decline substantially more in low-volatility regime than in high-volatility regime. However, this paper did not analyze the possible feedback from housing returns to interest rate. More importantly, with no confidence intervals provided for the impulse response functions generated from the MS-VAR model, one cannot gauge whether the effects were significant or not.

Though a few studies, namely, Gupta and Ndahiriwe (2010), Gupta et al. (2010) and Ncube and Ndou (2011), indicate a negative impact of monetary policy on house prices in South Africa, none of these studies investigated the possible asymmetry in this effect. Further, studies, such as Ncube and Ndou (2011), Peretti et al. (forthcoming), Simo-Kengne et al. (forthcoming), which analyze the plausibility of a feedback from housing prices onto interest rate, did not say anything about the nature of this relationship during bull and bear housing markets. The reason being that all these studies, except Peretti et al. (forthcoming), used linear (structural, factor-augmented and panel)VAR models, and hence, could not account for possible non-linearities in the relationship between interest rate and house prices that could exist under different states of the housing market. Peretti et al. (forthcoming) used a time-varying parameter VAR model, which accounted for non-linearities in the relationship between consumption, interest rate and house prices, and was able to depict the changes in the nature of this relationship over time. However, this paper, did not discuss how monetary policy reacted to house price movements during bear and bull markets, though it could have, having identified the regimes.

South African housing market is categorized into luxury, middle and affordable segments based on the price of the properties, with the middle-segment being further divided into, large, medium and small based on sizes of the houses.[7] In this paper, besides analyzing the entire middle-segment, we also look at the different size category of this segment, to capture possible heterogeneity in the relationship between house prices and interest rate. Given that a MS-VAR is parameter intensive, we use the maximum possible span of monthly data covering the period of 1966:1-2011:12, which is a departure from the quarterly data-based earlier studies related to house prices and interest rate in South Africa. In this regard, note that, with house price being identified as a leading indicator, Gupta (forthcoming) emphasizes that one should carry out the analysis on housing markets at the highest possible frequency. Due to this, we had to rule out the luxury and affordable sections of the housing market, since data on these two segments are only available at quarterly frequency. However, with Gupta et al. (2010), Das et al. (2011) and Inglesi-Lotz and Gupta (forthcoming) indicating that policies does not significantly affect these two extreme ends of the market, we believe, that the compromise in the form of losing information on the luxury and affordable segments by using monthly frequency, is not a serious one. As in the existing literature on housing markets and interest rate in South Africa, the monetary policy instrument is chosen to be the three months Treasury bill rate.[8] Ultimately, we look at four sets of bivariate MS-VAR models[9] comprising real house price of the entire, large, medium and small middle-segments considered individually, along with the three months Treasury bill rate. The rest of the paper is structured as follow: Section 2 briefly presents the Markov switching framework and discusses the estimation and identification procedures, while Section 3 describes the data used. Section 4 reports the empirical results with regard to the potential asymmetric effects of monetary policy on house prices and vice versa. Finally, Section 5 concludes.

2. Methodology: Markov-Switching vector autoregressive (MS-VAR) model

The use of the Markov-switching approach has become popular for determining asymmetries. This methodology initially appeared in the form of switching regressions in Golfeld and Quandt (1973), and underwent a number of extensions and refinements. Hamilton

[4] Note that, Naraidoo and Ndahiriwe (forthcoming) and Naraidoo and Raputsoane (2010) using linear and non-linear Taylor rules had indicated that the SARB reacts to a financial conditions index, which included real house prices, besides, real effective exchange rate, real stock prices and credit spread. For a detailed international literature review on the response of monetary policy to asset prices the reader is referred to Andre et al. (2011) and Peretti et al. (forthcoming).

[5] The reader is referred to Napolitano (2006) for a detailed literature review.

[6] As far as the housing market is concerned, studies such as Garino and Sarno (2004), Xiao and Tan (2006) and Feng and Li (2011) have used univariate Markov-switching unit root tests to detect house price bubbles in the UK, Hong Kong and Seoul, and Beijing, respectively. Prior to that Hall et al. (1997) had used a univariate Markov-switching error correction approach to model the housing cycle in the UK.

[7] See Section 3 on the data used for further details.

[8] It is believed that the housing market is unlikely to respond to policy actions that were already anticipated. Therefore, we utilized a measure of monetary policy surprise for our case, originally developed by Gupta and Reid (forthcoming) to analyze its impact on stock returns in South Africa. The monetary policy surprise was constructed using the change in the three month Banker's Acceptance rate on the day after the Monetary Policy Committee announces the official repurchase rate decision. Monthly values for the surprises were obtained by taking averages of the event-based data if there were multiple Monetary Policy Committee meetings in a month, and when there was no such meetings held in a particular month, the value of the surprise for that specific month was set to zero. The data covered the period of 2000:1-2011:12. Since, this measure is exogenous, we used a Markov-switching regression framework instead of a MS-VAR model. The results indicate that sudden adjustments occur contemporaneously in the dynamics of house prices due to unanticipated changes in monetary policy. House prices decrease with the increase in the monetary surprise, with a significant effect being reported in the bear regime. Moreover, the asymmetric effect of monetary policy emerges in all market segments; the coefficients being different in size and or signs across the states. Additionally, the bear market appears to be the most affected for all categories except the small segment, which shows a significant effect in the bull regime. In the same vein, we carried out our analysis treating the three month Treasury bill rate as exogenous using Markov-switching regressions. However, given that the fit of the MS-VAR models were consistently better than the Markov-switching regressions, indicative of, perhaps, the endogeneity of the three months Treasury bill rate, these results were suppressed to save space. Moreover, the MS-VAR approach offers the possibility to analyze joint dynamics, which in turn, better characterizes the behavior of financial time series. The details of all these results are available upon request from the authors.

[9] The reason for not including all the house prices together in a MS-VAR is to avoid the possible multicollinearity between the house price index for the entire middle segment and the house price indices of its three sub-categories. Besides, it is not advisable to go beyond three-variable MS-VARs due to the problem of overparameterization leading to imprecise inferences (Perlin, 2011).