

Research on Chinese Monetary Policy: Targets Extend to Asset Prices

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Abstract This paper attempts to measure the impact of monetary policy on the asset prices. We apply a lag augmented vector autoregression (LA-VAR) to investigate the impact of monetary policy on asset prices with an empirical study of Chinese monetary policy from 1998 to 2008. The result shows that the adjustment of interest rate follows the stock market change which proved to be the granger reason of interest rate. This indicates that Chinese monetary policy refers to asset prices, its targeting to asset prices supports that proper monetary policy can affect asset prices and reduce the fluctuates of asset prices.

Key words Monetary policy; Asset prices; LA-VAR; Monetary policy target

1 Introduction

Asset prices volatility has become one of the most discussed issues in the press and in the academic literature. Both in developed and developing countries it is a recent and strong trend as the volatility of asset prices like stock and house leads to financial system instability and economic depression (Allen, Franklin and Douglas Gale, 2000). Large swings have been associated with strains in the financial sector and in the real economy. There are many reasons to these asset prices bubbles, more and more economists believe monetary policy plays a great role in the volatility of asset prices. (Borio, Fennedy and Prouse 1994) find that inflation of asset prices is due to financial reform with more load opportunities by imposing data in Japan, Holland, and England. (Sellin 1998), investigating dozens of papers, conclude that monetary policy plays a significant role in stock market, expansionary monetary policy leads to the inflation of stock market. (Rigobon and Sack 2001) argue that interest rate increase may induce the decline of stock prices in a short time. (GuoYe and Cai Zongwu 2009), based on functional coefficient instrumental variables model, propose that the wrong monetary policy of changing federal fund rate sharply may be some possible reasons of the financial crisis in the United States.

Development in the relationship between monetary policy and asset prices becomes a great challenge for central banks. There are two opposite opinions about the issues whether monetary policy should take asset prices into account. (Bernanke and Gertler 2001) argue that price stability is the only objective of a central bank and asset prices have to be taken into account only as long as they signal changes in expected inflation. (Cecchetti, Genberg, Lipsky and Wadhawani 2000) provide examples where a more proactive policy has stabilizing effects on the economy. Numerous studies address the issue of the intricate relationship of monetary policy and asset prices. The issue of how to utilize monetary policy to affect asset prices, however, has remained unsolved and continues to draw much attention.

In this paper, we develop a lag augmented VAR model to investigate the relative role of monetary policy and assets prices in China. By imposing several monetary elements in the model through Granger causality test, we identify four elements have effect on stock and house prices: interest rate shock, loans shock, money supply M1 shock and money supply M2 shock. The role of these elements in stock and house prices is tested via the impulse response function to various shocks. If asset prices appreciate Granger causality test to show as the reason of some monetary policy elements, and these elements asymmetric demand shocks account for a large portion of asset prices variations, then the monetary policy aims at asset prices and flexibility helps to stabilize asset prices. If asset prices are not the reason of monetary policy and only driven by it, monetary policy is likely to be only a source of asset prices variations.

We are interest in the role of monetary policy adjustment in China for two reasons: First, China raises interest rate several times in the period of stock market expanding in 2007 regardless of the stable CPI. Monetary policy has already been used to control asset prices in an economy like China, which is typically viewed as planned economy. Second, Chinese economic steady growth in the last ten years or so is unprecedented among developing economies. The stable asset prices may help to achieve the objective of sustained economic growth. China may give the example to propose to utilize monetary policy to control asset prices for stable economy development.

The rest of paper is organized as follow: section 2 discusses the economic methodology of lag VAR

modeling, section 3 reports the empirical results, and section 4 gives a brief conclusion.

2 The Model

Causality testing in Granger sense is conventionally conducted by estimating autoregressive or vector autoregressive (VAR) models. (Toda 1995) shows that pretesting for cointegration rank in Johansen-type error correction mechanisms (ECMs) are sensitive to the values of the nuisance parameters, thus causality inference based upon ECM may be severely biased. Theoretically simpler and computationally relatively straightforward causality tests have been proposed by (Toda and Yamamoto 1995), which involve a modified Wald (MWALD) test in an augmented VAR model, and do not require pretesting for cointegration properties of the system. The idea underlying the Toda–Yamamoto (TY) test is to artificially augment the true lag length (say, p) of the VAR model by the maximal order of integration (d_{\max}) that might occur in the process. Then, one can estimate the VAR model with a $(p+d_{\max})$ order, ignoring the coefficients of the last d_{\max} lagged vectors, and test the linear or nonlinear restrictions on the first k coefficient matrices by the standard Wald test. Toda and Yamamoto (1995) prove that the Wald statistic used in this setting converges in distribution to a χ^2 random variable, no matter whether the process is stationary or nonstationary. The preliminary unit root and cointegration tests are not necessary to implement the DL test, since the testing procedure is robust to the integration and cointegration properties of the process.

Consider the following VAR(p) model:

$$y_t = \gamma + A_1 y_{t-1} + \dots + A_r y_{t-r} + \dots + A_p y_{t-p} + \delta_t \quad (1)$$

where, y_t , γ , and $\delta_t \sim (0, \Omega)$ are n -dimensional vectors and A_k is an $n \times n$ matrix of parameters for lag k . To implement the TY test the following augmented VAR ($p+d$) model to be utilized for the test of causality is estimated,

$$\hat{y}_t = \hat{\gamma} + \hat{A}_1 \hat{y}_{t-1} + \dots + \hat{A}_p \hat{y}_{t-p} + \dots + \hat{A}_{p+d} \hat{y}_{t-p-d} + \hat{\delta}_t \quad (2)$$

where the circumflex above a variable denotes its ordinary least squares (OLS) estimate. The order p of the process is assumed to be known, and d is the maximal order of integration of the variables. Since the true lag length p is rarely known in practice, it can be estimated by some consistent lag selection criteria. The j th element of y_t does not Granger-cause the i th element of y_t , if the following null hypothesis is not rejected:

$$H_0 : \text{the row } i ; \text{ column } j \text{ element in } A_k \text{ equals zero for } k = 1, \dots, p. \quad (3)$$

The null hypothesis is tested by a Wald test which is named modified Wald test in case of the augmented VAR.

3 Data and Empirical Results

3.1 Data

All the data used in this study are monthly observations that cover the period of 1998 to 2008 obtained from RESSET Financial Research Database. We include four monetary policy element indicators: the benchmark interest rate (R), the money supply m1, the money supply m2, the loans (L) and two asset prices elements indicators: the stock index of shanghai (SP) and the real Estate climate Index(HP). In contrast to earlier studies, we take the change of house prices into account and choose to disaggregate into stock and house VAR model. All the data are transformed to natural logarithms.

In order to specify properly the VAR, we test for unit roots and stationary. According to the feature of lag augmented VAR, stationary can be achieved from the first difference for all the series. The first subsection begins with unit root test; the second subsection proceeds with the granger causality test; the third subsection reports the impulse response function.

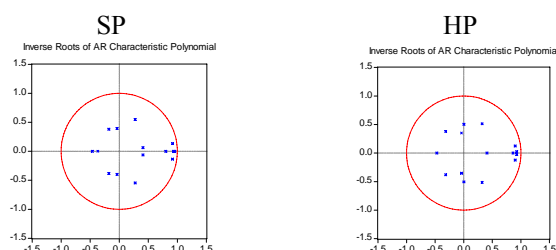


Figure 1 Unit Root Test

3.2 Unit root test

Unit root test shows all roots have modulus less than one and lie inside the unit circle for all the series as figure1, which means the VAR is stable, certain results (such as impulse response standard errors) are valid. To employ the DL test, we estimated the lag length of an unrestricted VAR model of Eq. (1), since it is not known a priori. The optimal lag length was estimated as 2 by means of the final prediction error (FPE), and Akaike information criterion (AIC). Thus, stable conditions are got with the VAR(3) model of stock and house prices.

3.3 Granger causality test

The table1 indicates that there is no obvious causality from interest rate, M1, M2 and loans to stock prices and shows Chinese stock market changes are not caused by monetary policy form 1998 to 2008. Meanwhile, stock index is the Granger reason for interest rate at 5% level, showing interest rate changes according to stock market. This implies that interest rate has taken asset prices into account to meet the targets of stable asset prices. Table 2 shows interest rate, M1 and M2 are not the cause of HP, only loans is the Granger reason of house prices at the 5% level. This is mainly because a large proportion of loans are housing loans in China.

Table 1 Granger Causality Test to Stock Prices

Hypothesis	Chi-sq	Lag	Prob.	Decision
L dos not cause SP	1.7865	3	0.6179	Do not reject
SP dos not cause INV	1.5054	3	0.6810	Do not reject
R dos not cause SP	2.6029	3	0.4570	Do not reject
SP dos not cause R	11.7411	3	0.0083	Reject
M1 dos not cause SP	1.9956	3	0.5733	Do not reject
SP dos not cause M1	14.0186	3	0.0029	Reject
M2 dos not cause SP	3.5379	3	0.3159	Do not reject
SP dos not cause M2	1.8854	3	0.5965	Do not reject

Table 2 Granger Causality Test to House Prices

Hypothesis	Chi-sq	Lag	Prob.	Decision
L dos not cause HP	19.0862	3	0.0003	Reject
HS dos not cause L	0.9465	3	0.8142	Do not reject
R dos not cause HP	2.8903	3	0.4088	Do not reject
HP dos not cause R	4.8074	3	0.1865	Do not reject
M1 dos not cause HP	3.0259	3	0.3876	Do not reject
HP dos not cause M1	7.2672	3	0.0639	Do not reject
M2 dos not cause HP	3.7363	3	0.2914	Do not reject
HP dos not cause M2	1.2415	3	0.7431	Do not reject

3.4 Impulse response functions

We examine the impulse response of each variable to a positive innovation in each of the fundamental shocks, the accumulated impulse responses are report in figure2.

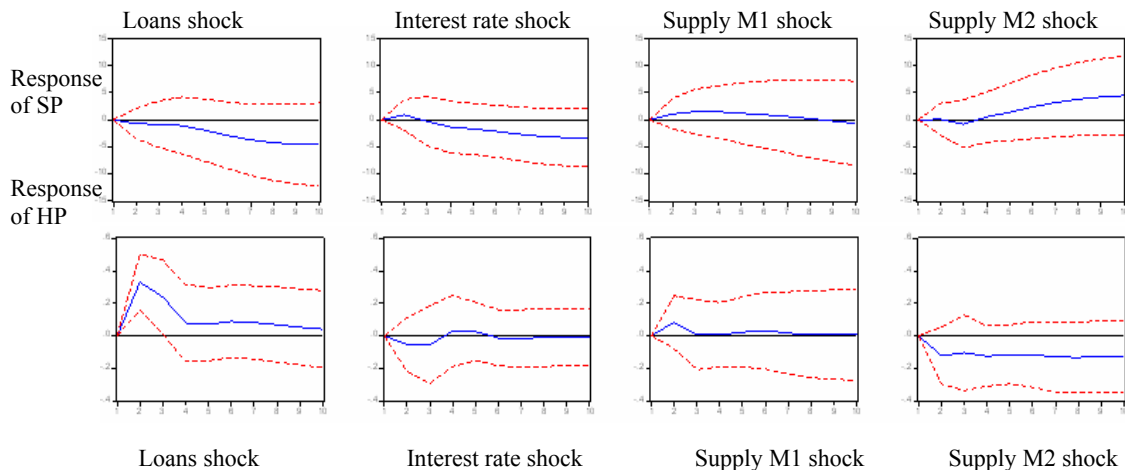


Figure 2 Impulse Responses

In response to a positive loans shock, house prices increase significantly on impact while stock prices decline. It is mainly because of house loans taking a large part of all the loans, which indicates the central bank can use loans policy to control house prices and we find such a valid effect of house loans policy of China recently.

In response to an increase in the interest rate, both stock and house prices depreciate significantly, indicating that central bank can use tightened monetary policy to control the inflation of asset prices. Meanwhile a positive money supply M1 has significantly increase effect on asset prices over the whole horizon.

In response of a money supply M2 shock, the relative stock prices decrease for the first four months and soon returns to a higher level. The response of house prices depreciates significantly on the impact and remains depreciate in the long run. The finding suggests money supply M2 have more negative effect on house prices.

In general, the monetary policy has much more effect on stock prices, which accords with Yi Gang and (Wang Zhao 2001), using monetary policy-stock prices transmit mechanism model, observe monetary policy influence upon financial asset prices, especially upon stock prices. It echoes the fact that monetary policy has been effective, especially the policy of interest rate and fluidity changed by a great augment. Although the stock prices have reached a high level in China since 2007, the effect of tighten monetary policy has occurred and helped to lower the stock prices in 2008. As for the inflation of house prices, monetary policy may not have sufficient impact. It may need to be assisted by administrative and industry means.

4 Conclusions

In this paper, we study the impact of Chinese monetary policy on asset prices with a lag augmented VAR model during the period of 1998-2008 in China, finding that monetary policy has included asset prices as reaction function. Results show that interest rate adjustment mainly refers to stock prices, its reaction to house prices is minus or non significant. The impulse response shows that interest rate can affect the asset prices movements, and validate the negative and significant impact on asset prices.

Although in the theoretical literature the most discussed policy issue is whether central bank should include asset prices in their policies, as (Ju Qiang 2007) believes it need new theories to explain the challenges of price stability and asset prices inflation for monetary policy. The cases of china can be viewed as a leading indicator of monetary policy for growing economy. It implies that goal of asset prices is vitally important to meet the optimal policy adjustment, hence to sustain the economic growth.

Asset prices volatility and monetary policy mechanism need for further research with more factors considered in the model. Chinese economic and financial structure itself is always undergoing changes, which makes the study of Chinese economic variables difficult. It is also need contrast with the data of other countries. We plan to work on this project in the future.

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