

Monetary Policy, Asset Prices and Consumption in China

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Abstract: This study demonstrated the strength of the monetary policy and transmission mechanism in China with respect to the wealth channel. Applying a structural Vector Autoregressive (VAR) analysis, we find that neither the Shanghai stock price index nor the housing price index of Shanghai has any effect on consumption in China through monetary policy. This paper is an extension of a working paper of European Central Bank (ECB) with updated quarterly data series from 2006 to 2013. This paper concludes that further reforms are required in the mortgage market for financial transparency and capital flows to ensure that China can continue on its inclusive growth path

Key Words: Wealth channel, Asset prices, Monetary policy, Consumption, China.

INTRODUCTION:

China is the largest economy in the world in Purchasing Power Parity terms. It is seen as the dominant economic force leading the economies of the rest of world. In the last monetary policy statement, Federal Reserve took a U-turn from increasing the policy rate by keeping it unchanged in fear of the consequences that would lead to through the economic slowdown in China. Many analysts also reported that China is now leading the monetary policy of the United States. After slashing its own policy rate for the 6th time in a year, China's one-year benchmark lending rate stands at 4.35%. With consistent expansionary monetary policy and an average growth rate of 9% from 2010 to 2015, China has been able to reduce its poverty from having 244.4 million people below the poverty line of \$1.25 per day in 2005 to less than 150 million people below the poverty line of \$1.25 per day. This remarkable feat was achieved due to an increase in rural-urban migration and an increase in the disposable personal income. However, the impact of these economic developments on the Chinese people through the wealth channel has not yet been analyzed and so this paper attempts to fill this gap.

It is no surprise that China uses its monetary aggregates as its monetary tool rather than opting for interest rate changes (Chen and Werner, 2011). However, China's focus is now shifting to the use of interest rates as its primary tool for manipulating the markets. The response of monetary aggregates for the two different wealth channel proxies that we have taken for this study is interesting to find out due to the high volatility found in housing price index (Fig. 1). The Shanghai-A stock market price index and the Housing price index for Shanghai, both have been taken to represent the wealth channel for China.

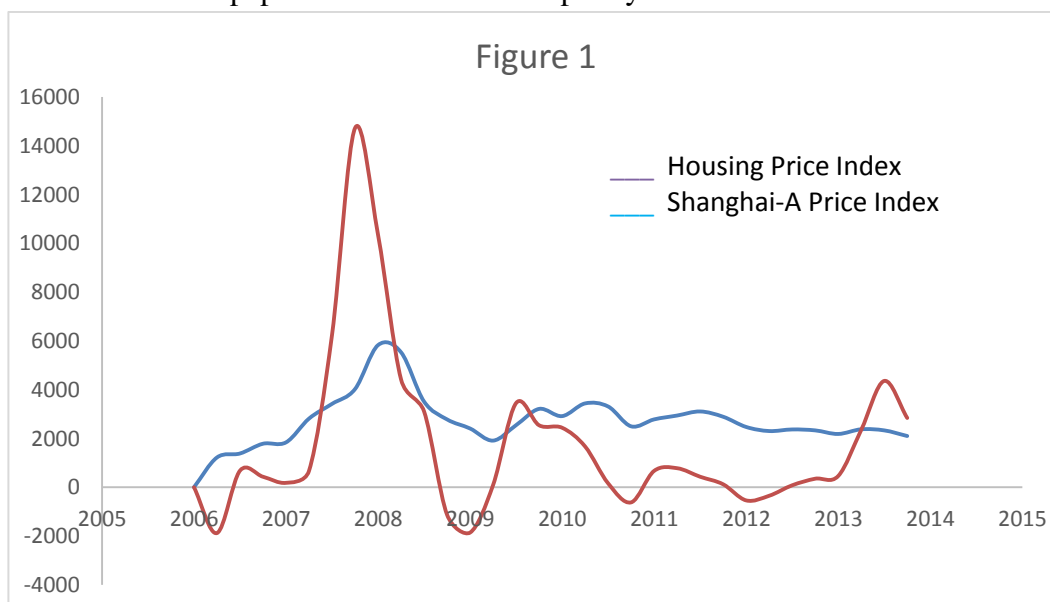
Shanghai Stock Exchange opened in 1990 and has witnessed quite some volatility in its earlier years. However, with China's willingness to adopt a more market oriented approach towards capital and financial markets, consistent reforms with deregulation had been introduced due to which the stock exchange witnessed stability. The current global economic slowdown and the depreciation of the Renminbi had caused a dip in the Shanghai stock exchange but as investors know that Renminbi is coming closer to its true market value, the stock market is recovering again.

By the end of 2013, the residential prices in Shanghai were at their peak. The bubble burst as soon as 2014 started. Property prices in China would not reflect much about the economy 10- 15 years back.

In January 2012, according to National Bureau of Statistics China, 51.3% of total population was recorded as urban population, setting record demand for real estate. High rural-urban migration, consistent economic growth and a never ending attitude of high savings has allowed the real estate to be key economic sector of the country. Investment of an average 10% of GDP takes place in real estate. Real estate like many other sectors in China currently is facing over capacity which is driving down the prices.

We consider M2 as the monetary aggregate tool to represent monetary policy in China as base money acts as a leading indicator for M2. Inflation is taken as growth in Consumer Price Index (CPI). Household consumption and household personal disposable income are used as responses to changes in wealth. Wealth channel is split into two channels – one is the housing price index and other is the Shanghai-A stock price index. All data is in real terms and in log except for Inflation (not in logs) and housing price index (not in logs/real). Quarterly data is taken from 2006q1 to 2013q4. Data was originally collected by Chun Chang, Kaiji Chen, Daniel F. Waggoner, and Tao Zha for the paper “Trends and Cycles in China’s Macroeconomy”.

The paper is structured in four divisions. First, we give a short literature review of work on China’s monetary policy, asset prices and consumption. Secondly, we describe the data and methodology used for this study. Thirdly, we discuss the results of our estimations and impulse response functions. And lastly we conclude the paper with some relevant policy recommendations.



Literature review:

A wealth channel approach to monetary policy works when the central bank targets the relevant asset prices in an economy to influence the real economic variables such as income and consumption. After the Great Depression, Fisher (1933) found out that a slump in stock prices can very well result in an economic recession.

Monetary policy can influence asset prices in various ways. Interest rates hold significance for any entity that has debt obligations. High inflation serves as a termite for current debt. Interest rate manipulations affect inflation and thus the amount a borrower has to repay in real terms (Aarstol, 2000). Interest rates also affect companies’ future earnings and stock dividends. In addition, a liberal monetary policy makes equity holdings more lucrative as compared to bond holdings, increasing the demand for stocks (Mishkin, 1996). However, recent studies have found out that targeting asset prices through monetary tools might eventually result in a negative outcome for the economy.

Mishkin (2001) noted that asset prices themselves are quite vulnerable to external shocks and thus to use them as tools for monetary policy transmission will not only result in distorted outcomes but will

also erode the authority of the central bank as an institute promoting market values. Same results were received by Bernanke and Gertler (2000) for case of United States and Japan.

Interest rates affect the housing prices through the user cost of capital (Mishkin, 2007). A surge in interest rate raises the user cost of capital, in turn reducing the demand for real estate. An empirical study using structural VAR to estimate the impact of monetary policy on housing market was conducted by Iacoviello (2000) for Europe which showed that monetary policy does in fact has an impact on housing prices. McDonald and Stokes (2013) applied the VAR analysis on the U.S. housing and found that an expansionary monetary policy led to a surge in housing prices.

Wealth channel can only work if the monetary policy successfully affects the asset prices and the asset prices successfully affect consumption. For China, Koivu (2012) found out that overall the wealth channel carries trivial importance, with consumption mostly responding to housing prices. However, it's important to note that changes in monetary policy can impact consumption through ways other than asset prices, depending upon the financial market and asset market structure as Siokis (2005) found out for the case of Athens. The effectiveness of asset price changes to wealth accumulation and eventually consumption depends on the efficiency and completeness of the mortgage market, in the case where wealth is taken to be influenced by housing prices. Catte, Girouard, Price and Andre (2004) studied the OECD countries for their wealth channel effectiveness and found that countries which had large and complete (offering a wide variety of borrowing plans) mortgage markets were the ones which had the most successful transmission mechanism from asset prices to consumption.

Much work has been done to study the monetary policy role in affecting asset prices in China and also on the dynamic and long run relationship between asset prices and consumption in China, but seldom work has been done on monetary policy's role in affecting asset prices which impact consumption in China. This paper attempts to fill this research gap. Tao and Binkai (2014) studied the wealth effect of productive fixed assets and nonproductive housing asset based on household survey data of China. They found out that housing assets have no wealth effect on consumption in China, implying that housing assets are consumer goods rather than investment goods in China. To study the impact of monetary policy intervention on asset prices and inflation in China, Shenglong, Giufu and Shigeyuki (2014) applied a VAR estimation on a panel data which showed that monetary policy positively affects asset prices even though it is overall ineffective. Furthermore, Shuji, Dan and Lixia (2013) found out from the monthly data on monetary aggregates and asset prices that households in China are speculative and irrational in the short term with respect to monetary policy against asset prices. Households tend to invest more in housing amid tight monetary policy measures.

DATA AND METHODOLOGY:

This study aims to fill the gap of research by targeting the impact of monetary policy on asset prices and consumption by using quarterly data from 2006 to 2013. Data is taken from the working paper series "Trends and Cycles in China's Macroeconomy" data base which used the original data of CEIC (China Economic Information Center). Five variables are included in this study namely household consumption, disposable income, broad money supply M2, Inflation and our asset prices variables of Shanghai-A price index and housing price index. All the variables are in log and real terms except for inflation (not in log) and housing price index (not in log or real).

Inflation is measured as growth in Consumer Price Index (CPI). Household consumption is represented by household expenditure. All the variables are in units of billions of Renminbi. M2 monetary aggregate is used to represent the monetary policy of China as it closely follows the base money trend which is representative of the real liquidity in the Chinese economy. We do not have data on wealth of households in China so we take the two variables representing the asset market as our proxies for wealth of households in this study. One is the Shanghai-A index and other is the housing price index.

To account for the feedback effects, we employ a structural Vector Autoregressive Model (VAR) where we consider all the variables as endogenous. Reduced form of a simple VAR model is

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + \mu_t$$

Where the vector y_t contains K endogenous variables. A_i represents the $K \times K$ matrix of coefficients representing the dynamic effects of the y_t sequence. The error vector μ_t is assumed to be serially uncorrelated. This model eliminates the estimation of the contemporaneous effect, which we require for our estimation. A structural VAR model is of the form

$$A y_t = A^*_1 y_{t-1} + \dots + A^*_p y_{t-p} + B \varepsilon_t$$

Where the structural error vector ε_t is assumed to be serially and cross-sectionally uncorrelated. The relationship between the error terms in the reduced form and the structural form is

$$\mu_t = A^{-1} B \varepsilon_t$$

If we write the above relationship as $A \mu_t = B \varepsilon_t$ then we can describe the structural error (ε_t) vector being explained by the contemporary reduced form shock vector (μ_t). To prevent the identification problem, we must impose a restriction on A and B of the form $2K^2 - K(K+1)/2$. Our $K=5$, so we must impose 35 restrictions.

$$\begin{bmatrix} 1 & 0 & * & 0 & 0 \\ * & 1 & * & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ * & * & * & 1 & * \\ * & 0 & * & * & 1 \end{bmatrix} \begin{bmatrix} \mu_t^{DI} \\ \mu_t^{HC} \\ \mu_t^I \\ \mu_t^{M2} \\ \mu_t^{AP} \end{bmatrix} = \begin{bmatrix} b12 & 0 & 0 & 0 & 0 \\ 0 & b22 & 0 & 0 & 0 \\ 0 & 0 & b33 & 0 & 0 \\ 0 & 0 & 0 & b44 & 0 \\ 0 & 0 & 0 & 0 & b55 \end{bmatrix} \begin{bmatrix} \varepsilon_t^{DI} \\ \varepsilon_t^{HC} \\ \varepsilon_t^I \\ \varepsilon_t^{M2} \\ \varepsilon_t^{AP} \end{bmatrix}$$

Where * indicates the parameter is estimated without any restriction in the system. According to the literature, real income is allowed to have an immediate affect to shocks to inflation as nominal wage would take time to adjust to price changes. Shocks to consumption, money supply and asset prices are to have a lagged effect on disposable income. Consumption is allowed to respond immediately to shocks in household income and inflation whilst it is only affected by a lag of one period to shocks to money supply and asset prices as suggested by (Bagliano and Favero, 1998). Monetary aggregate M2 is allowed to respond to shocks to all other variables immediately as the literature suggests (Bernanke and Mihov, 1998). Even though Peoples’ Bank of China (PBC) claims that it does not target asset prices through monetary policy, the evidence through data suggests otherwise and therefore we allow money supply to respond to asset prices shock immediately. Lastly, the asset prices are allowed to respond immediately to shocks to all other variables except consumption, to make sure the necessary number of restrictions hold.

Using this approach accounts for the number of variables in our study, however, we can alternatively employ the Cholesky decomposition factorization directly on the impulse response functions for proper identification of our VAR system. We applied the Cholesky decomposition to the Variance-Covariance matrix of the residuals, taking degrees of freedom into account and found minor differences in the Impulse Response Functions (IRF) and therefore we report our findings based on the structural factorization of the Variance- Covariance Matrix which takes into account the ascending nature of exogeneity in the variables.

SVAR estimation:

We first test the stationarity of data using Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) test. We find that all our variables are integrated of order one. Then we run the Johansen Cointegration test to find out if the variables have any long run relationship. We did find cointegration among variables but the sample size of just 33 observations questions the reliability of this relationship.

Furthermore, we have no evidence from the literature on the suitable number of cointegrated vectors. We continue to apply VAR in levels without taking into account the number of cointegrated vectors as this does not lead to a misrepresentation of the asymptotic properties of the results if there are at least two lags in the system as suggested by Lütkepohl (2004).

We estimate two models of SVAR, one with housing price index as our representation of asset prices and the other with Shanghai-A price index as representation of asset prices. The lag length in both the models is two according to the lag length criteria of AIC.

We then run the diagnostic tests to check the models for misspecification. LM test for autocorrelation for both the models show no signs of autocorrelation whereas the Portmanteau test for both the models shows signs of autocorrelation in the residuals, with housing price index model showing greater autocorrelation due to the fact that it is not log terms. The AR roots table shows that the VAR system is stable as no characteristic root lies outside the unit circle. The residuals from the both the models are stationary and thus white noise. The Jarque- Bera test shows that the residuals are normally distributed for both the models.

The impulse response functions from the structural factorization method are stated in the Appendix where A1 shows the housing price index model and A2 shows the Shanghai-A price index model. The response of one standard deviation shock to each of the variables with their relevant confidence intervals are shown for a period of 10 quarters.

Shocks one to five are in the following order. 1) Shock to disposable income. 2) Shock to consumption. 3) Shock to Inflation. 4) Shock to money supply. 5) Shock to asset prices. The results from both the models validate the general economic theory. Consumption rises significantly as a result of a shock to disposable income. Money supply also responds well to a shock to inflation and asset prices. Central bank would decide to reduce the money supply in such a case and that's why the reduction in money supply is significant for at least a year. However, the response of inflation to a shock in money supply is barely significant and the result is valid for only less than a year. This implies that the role of monetary policy in affecting inflation in China has deteriorated since 2006.

Households react negatively to a shock in income with regard to housing market whereas they react positively towards the stock market with a positive shock to income. It's interesting to note however that after a year, the housing market responds positively to a shock in income quite significantly as compared to a not so significant impact of stock exchange. This could reflect the weak structure of the mortgage market in China which delays households investing decision in property as they take time to find the best borrowing scheme.

The wealth channel evidence exists for only housing and does not hold for the Shanghai stock exchange as a positive shock to the money supply does not trigger positive reaction in the Shanghai stock exchange whereas a positive shock to money supply triggers a minor positive response in housing assets for a year. Shanghai stock exchange has been highly volatile ever since China came on the forefront of the global economic race. When money supply increases in the Chinese economy, it decreases the true value of Renminbi which of course is artificially held constant by PBC using its huge foreign exchange reserves. Only a minor fraction of households in China invest in the stock exchange and even though the trend is changing, the overall volume is still pretty low as most use traditional bank deposits as their primary saving scheme. The second part of the wealth channel that is the response of consumption due to changes in asset prices does not hold for either of the models. The response of consumption is negative for Shanghai-A price index model immediately whereas the response of consumption turns negative for housing model after a year. Consumption does react positively but only after two years in the case of Shanghai price index model and after three years in the case of housing price index model. One dominant reason why households do not transform their temporary increase in wealth to consumption could be the high level of volatility in both these

markets and add to that the general trend of uncertainty relating to government policies in China. Finally, we see the money supply shock response to the consumption directly. In the housing price index model, money supply fails to influence consumption. Consumption turns negative after two years. Whereas, for the Shanghai-A price index model, consumption responds positively and significantly. It continues to stay positive for more than three years. The difference in the behavior of consumption in both the models can be attributed to the fact that households who invest in property cannot realize the gains of increased liquidity as fast people who have invested in the stock exchange. Also, plans to invest savings in property will hardly diverge because of increased liquidity whereas plans to invest savings in stock can easily divert into immediate consumption due to increased liquidity.

RESULTS AND DISCUSSION:

This paper attempted to find a relationship between monetary policy, asset prices and consumption in China from 2006 to 2013. Monetary policy implications on asset prices and their effects on consumption were studied in this paper. We find that the wealth channel does not exist for China. The monetary policy does not successfully influence asset prices and the asset prices do not successfully influence consumption in China.

The results of this study are not surprising as China's financial market and the mortgage market, both are still quite immature. Structural reforms since 1990's have been introduced to make both these markets more transparent and market oriented. However, the roots of communism and control still lie at the very heart of the Chinese government which cannot resist meddling with these markets through various policy measures. The direct impact of monetary policy overall has improved as the housing market model suggests that increase in money supply affects consumption quite strongly and significantly even though the stock market model failed to support this view.

Asset prices play a strong role in determining the growth path of China. Having a poor response of monetary policy measures on asset prices does not necessarily indicate a hazardous future outlook for China. It simply means that asset prices are responding to other elements in the economy, for example exchange rate. However, a poor response of consumption due to asset price changes reflects that China still has a long way to go before its people can resort to more structured saving mediums such as real estate or stocks. This paper concludes that further reforms are required in the mortgage market and for financial transparency and capital flows to ensure that China can continue on its inclusive growth path.

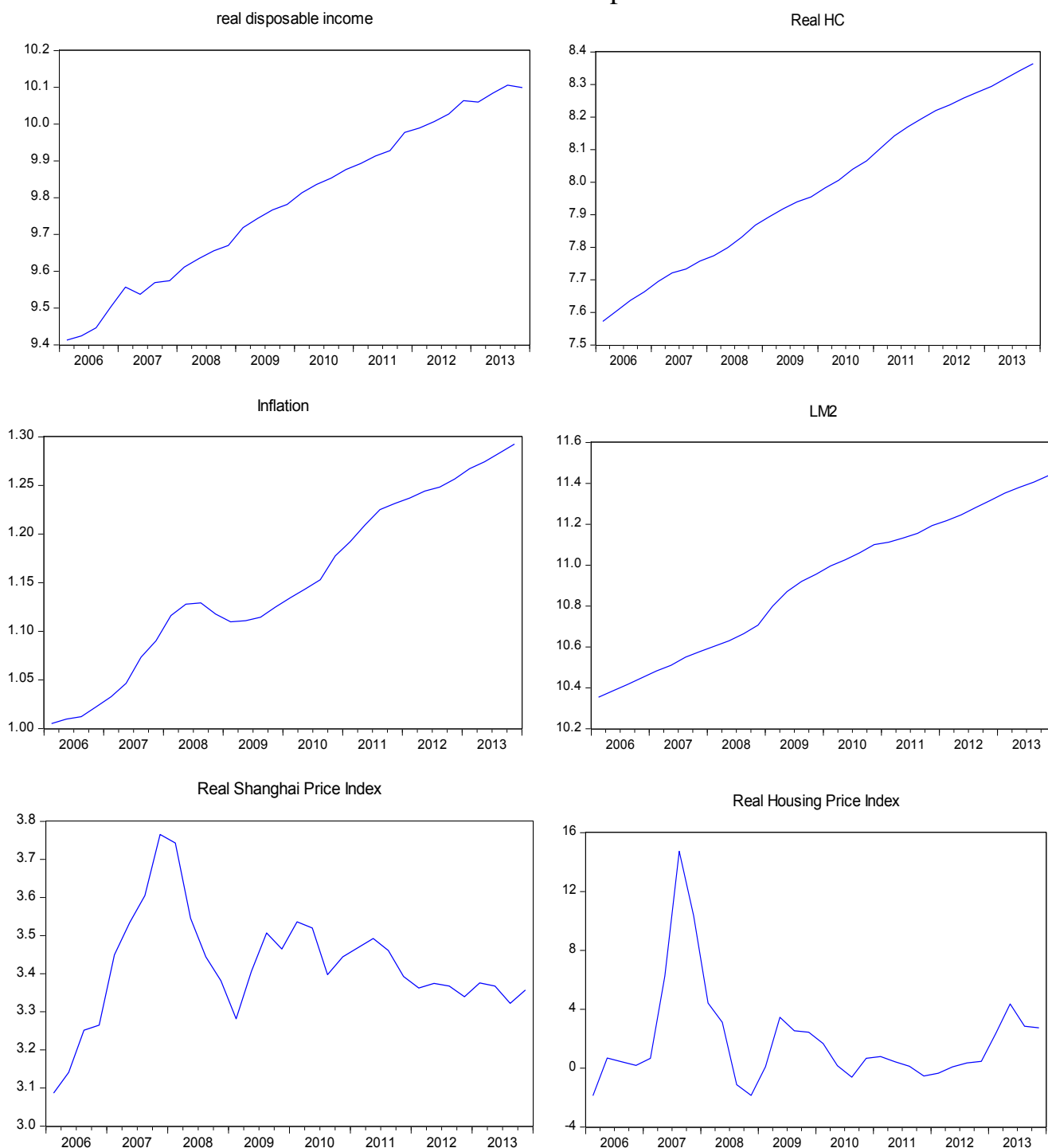
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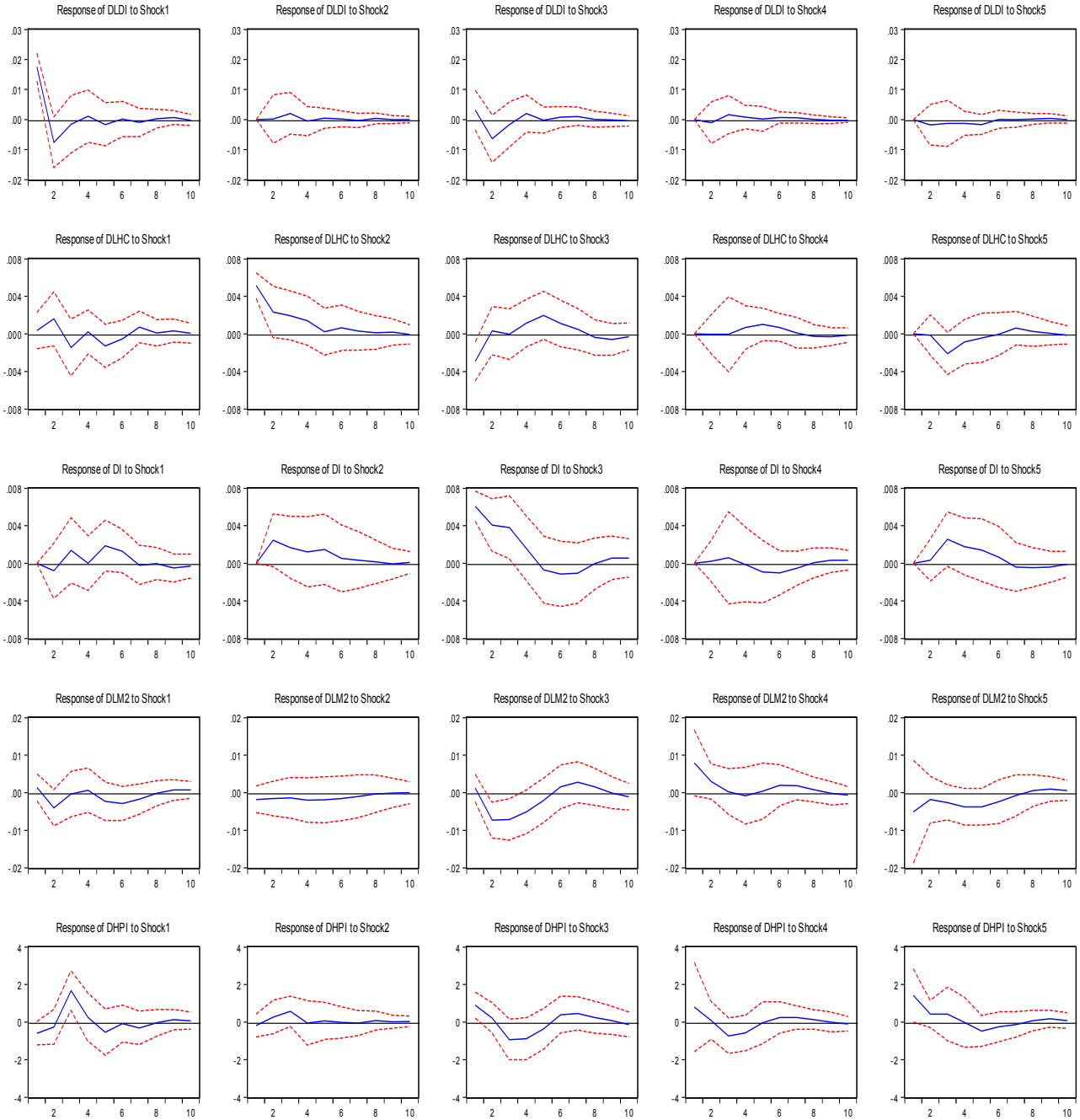
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Time Series Graphs



Housing Price Index Model – A1

Response to Structural One S.D. Innovations ± 2 S.E.



Shanghai-A Price Index Model – A2

Response to Structural One S.D. Innovations ± 2 S.E.

