H0t Money flow, Money supply, Mortgage Credit and Residential Property Prices in China

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Abstract

This paper studies the relationships between foreign reserve, money policy, credit, economic activity and residential property prices in China, using monthly data for May 2000-December 2011. Using a recursive VAR, we find plausible and significant responses to monetary policy and mortgage credit shocks but no significant responses to a foreign reserve shock for overall average residential property price. In contrast, responses of Beijing average residential property price to a foreign reserve shock are positive and significant. Also, the effects of money supply shock and mortgage credit shock are weaker for Beijing average residential property price. Our results suggest hot many flows tend to chase residential properties in large cities such as Beijing.

1. Introduction

   The dynamics of real estate price booms and bursts is broadly compatible

with observed movements in income, mortgage credit, monetary policy and

residential property prices. It is argued that the easing monetary policy in

the early 2000s contributed to the real estate price bubble that burst during

the recent global financial crisis in the United States (Taylor (2007),

Jarocinski and Smets (2008), Bernanke (2010)). On the other hand, Acharya

et al. (2011) criticize that poorly designed government guarantees for Fannie

Mae and Freddie Mac led to the debacle of mortgage finance in the United

States.

   With growing incomes, development of residential property market and

expansion of mortgage credit easily available, the demand for housing has

been expanding and residential property prices have been accelerating.

Recently, the housing price is comparable to developed countries, though

China is an emerging economy. However, collapses after dramatic asset price

increases and rapid expansion of credit have played a central role in many

financial crises (see Ahearne et al. (2005), Goodhart and Hofmann (2007,

2008), and Hunter et al. (2003)). China analysts have been wary of the

potential of a real estate price bubble and its burst.

Previous studies examined the effects of money supply, stock market returns, inflation, mortgage credit policy and hot money on home price in China. China has its managed-floating foreign exchange system. The People's Bank of China has to purchase large amount of foreign currency inflow to China. The money inflow includes inward foreign direct investment and international trade surplus. Though the international capital market is strictly regulated, the interest rate difference and the anticipated appreciation of RMB might attract more and more hot money. Due to the managed-floating foreign exchange system, hot money might have stronger impact on real estate market in China.

Generally, the money inflow results in rapid increases in base money and money supply unless the central bank successfully sterilizes the foreign exchange. Bouvatier (2007) examine the relationship between real international reserves and real domestic credit in China during the period of January 1997 to March 2006, using a Vector Error Correction Model and the empirical results suggest that the People's Bank of China succeeded in slowing down real domestic credit when real international reserves

increased. On the other hand, Ruffer and Stracca (2006) find evidence of a significant spill-over of global liquidity on the euro area economy and in Japan.

Hot money inflow to China was also viewed as an important reason for real estate prices in China in Martine and Morrison (2008). A big concern is that "hot money" may be creating bubbles in its stock and real estate markets, although recent evidence suggests that the "hot money" was being largely deposited into bank accounts in Wright (2008).

Xu and Chen (2010) show that Chinese monetary policy behaviors are the key driving forces of real estate price growth in China. The results for the relationship of hot money and real estate price are mixed. Zhang and Fung (2006) find that lag one quarterly hot money flow has a positive effect on residential property price. Xu and Chen (2010), however, show that hot money flow has no significant impact on Chinese estate price after controlling for the money supply price.

Monetary policy, mortgage credit, real estate price are jointly determined endogenous variables. This paper seeks to contribute to this research agenda by shedding light on the relationship between monetary

policy, economic activity, mortgage credit, hot money flow and

residential-property in China. The rest of paper is organized as follows. In

section 2, we conduct an empirical analysis to examine the relationships

between foreign reserve, money policy, credit, economic activity and

residential property prices in China. Section 3 discusses the implication of

oour empirical analysis.

2. Data and Empirical Analysis

The empirical analysis is based on monthly data for China spanning the

period 2000May till 2011Dec. The set of data series used in the empirical

analysis comprises Foreign Reserve, Base Money, Mortgage Credit,

Industrial Production and nominal Residential Property Price. The data

source is ISI Emerging Market, CEIC data.

One common way of approximating the flow of "hot money" is to subtract a

nation's international trade surplus (or deficit) and its net flow of foreign

direct investment (FDI) from the change in the nation's foreign reserves.

Because "hot money" flows quickly and is poorly monitored, there is no

well-defined, direct method for estimating the amount of "hot money" flowing

into a country during a period of time. Hot money flows in the form of short-term foreign portfolio investments in equities, bonds and financial derivatives, short-term foreign bank loans and foreign bank loans with short term investment horizon. In China, however, there are no reasons to exclude the possibility that hot money flows in the forms of FDI and international trade. In our paper, we use foreign reserves as hot money.

We use a recursive VAR, ordered as (1) Foreign Reserve growth rate, (2) Base Money growth rate, (3) Mortgage Credit growth rate, (4) Industrial Production growth rate and (5) Residential Property Price growth rate. In the first equation of the corresponding recursive VAR, Foreign Reserve is the dependent variable and the regressors are lagged values of all five variables. In the second equation, Base Money growth rate is the dependent variable and the regressors are lags of all three variables plus the current value of Foreign Reserve growth rate. Mortgage Credit is the dependent variable in the third equation, and the regressors are lags of all five variables, the current value of Foreign Reserve, plus the current value of Base Money. In the fourth equation, the current value of Mortgage Credit is added to regressors of the third equation and Industrial Production change is the

dependent variable. Residential property price is the dependent variable and and the regressors are lags of all five variables, the current values of all other variables.

Table 1 summarizes the Granger-causality results for the VAR. The Wald test statistics in the first row indicate that Base Money growth and Industrial Production growth Granger cause the rise in Overall Residential Property Price. The hot money flow growth and mortgage credit growth do not help to predict the rise in Overall Residential Property Price as indicated by the insignificant Wald test statistics. The Wald test statistics in the second row, however, indicates that Foreign Reserve growth and Base Money growth Granger cause the increase in Beijing Residential Property Price.

The impulse responses for the recursive VAR, ordered Foreign reserve, Base Money, Mortgage Credit, Industrial Production and Residential Property Price,.are plotted in Figure 1. The first row shows the effect of an unexpected unit increase in Foreign Reserve, or Base Money, or Mortgage Credit, or Industrial Production on overall average Residential Property Price. The second row shows the effect of an unexpected increase of one percentage point in each of the above variable on Beijing Residential

Property Price. Also plotted are ±1 standard error bands, which yield an approximate 66% confidence interval for each of the impulse responses. Later, we can reconfirm this difference in impulse responses and forecast error decompositions.

These estimated impulse responses show persistent positive effects of shocks in Foreign Reserve, or Base Money, or Mortgage Credit, or Industrial Production on overall average Residential Property Price. But the effect of an unexpected hot money inflow on Overall Residential Property Price is very weak. In comparison, Beijing Residential Property Price's response to an unexpected hot money flow is stronger. This might suggest that hot money flow chases residential properties in large cities such as Beijing. But hot money does not chase residential properties all over China.

The forecast error decomposition at the 24 month horizon is shown in Table 2. Table 2 suggests considerable effects of monetary policy and mortgage credit policy on residential property price. Panel A indicates the error decomposition for the recursive VAR using overall average residential property price in China. At the 24 month horizon, 31% of the error in the forecast of the overall average residential property price is attributed to

monetary policy and 15% is attributed to mortgage credit policy. This is consistent with XU and Chen (2010)'s result that monetary policy and mortgage credit policy are two driving forces for acceleration in residential property price. In contrast, only 3.5% is associated with shocks in the growth of industrial production index. In addition, the effect of hot money flow is very weak and its percentage error decomposition is only 1.8%. Surprisingly, 48% of acceleration in residential property price is due to unexpected rises in residential property price.

Panel B indicates the error decomposition for the recursive VAR using Beijing average residential property price. The effects of money supply shock and mortgage credit shock are weaker and only 29% of rise in Beijing residential property price is due to monetary policy shock and mortgage credit policy shock. For overall average residential property price, But 7% of acceleration in Beijing residential property price is associated with hot money flow. This is larger than the percentage due to industrial production shock. Monetary policy shock, mortgage credit shock, hot money shock and economic activity shock explain about 40% of the variance of the error term in forecasting residential property price. The remaining 60% of the error in

the forecast of Beijing average residential property price is attributed to unexpected rises in residential property price.

It is worth noting that considerable percentage of the error in the forecast of residential property price is due to "own" shocks. This might reflect the inefficiency in the real estate market such as monopolistic supply of lands by local governments in China. An alternative interpretation is that local governments take policies to boost real estate prices because local government revenues strongly depend on land sales. Such local government policies may weaken the effects of a tightening mortgage credit policy by the central government. Also it might suggest the presence of a real estate bubble. In addition, persistent urbanization in China also contributes to acceleration of residential property price in cities. Similarly, Assenmacher-Wesche and Gerlach also show that the variances of residential property price in 17 OECD countries are predominantly due to own shocks.

In Xu and Chen (2010), the estimated insignificant coefficient on autoregressive lag one of residential property price is insignificant. In their monthly regressions on the change in China home price growth, benchmark rate, money supply, mortgage credit consumer price explain 80% of the

change in residential property price. In our paper, monetary policy and mortgage credit policy are important factors but only 46% of rise in overall residential property price is due to these policy shocks. For Beijing residential property price, policy shocks can only explain 29% of acceleration in residential property price. Our paper suggests that 50% or more of dramatic residential property price increases in China remains unexplained.

It is also worth noting that a hot money shock has a significant effect on Beijing residential property price. But the effect on overall residential property price is insignificant. Interestingly, Xu and Chen (2010) also find that hot money flow does not show any additional impact on the overall average residential property price beyond the money supply growth. One possible interpretation is that hot money flow tends to chase urban residential properties in China. Probably, overall residential property price is dominated by residential property prices in medium cities and thus hot money flow does not show a significant impact on Overall Residential property Price.

3. Conclusion

Real estate price booms are typically preceded by rapid and sustained

mortgage credit growth and easing monetary policy does not mean that monetary policy and mortgage credit policy account for most fluctuation of residential property price. The effects of monetary policy, mortgage policy and hot money on presidential price in China are limited. The variances of residential property price are predominantly due to own shocks. These results suggest that a negative shock on real estate can trigger a collapse in residential property prices.

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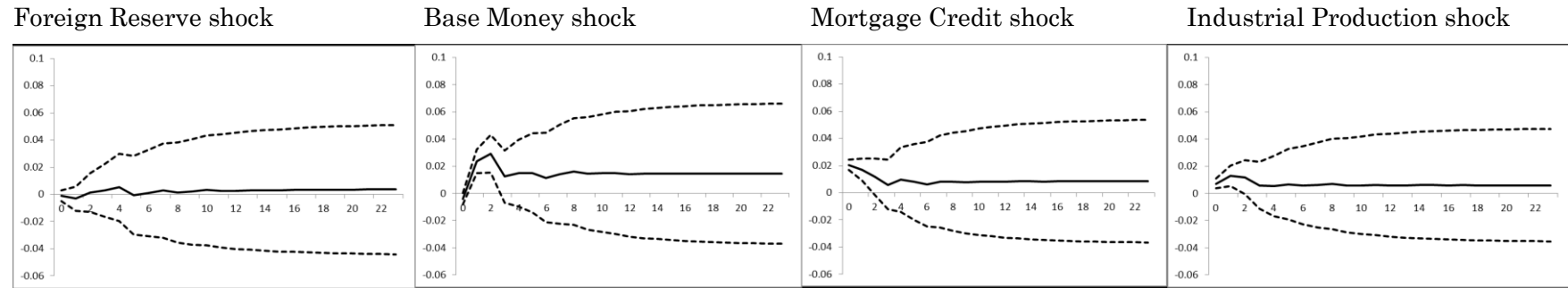
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Table 1 Granger Causality Tests

	Overall		Beijing	
	F-statistic	p-value	F-statistic	p-value
Foreign Reserve → Residential Price	0.4546	0.7689	2.2834	0.0643
Base Money → Residential Price	13.6650	0.0000	6.2041	0.0001
Bank Loan → Residential Price	0.4124	0.7994	0.6514	0.6270
Production → Residential Price	1.3854	0.2431	1.1545	0.3345
Residential Price → Residential Price	3.3130	0.0130	2.0953	0.0857

Figure 1 Impulse responses of residential property price

A: overall average residential property price

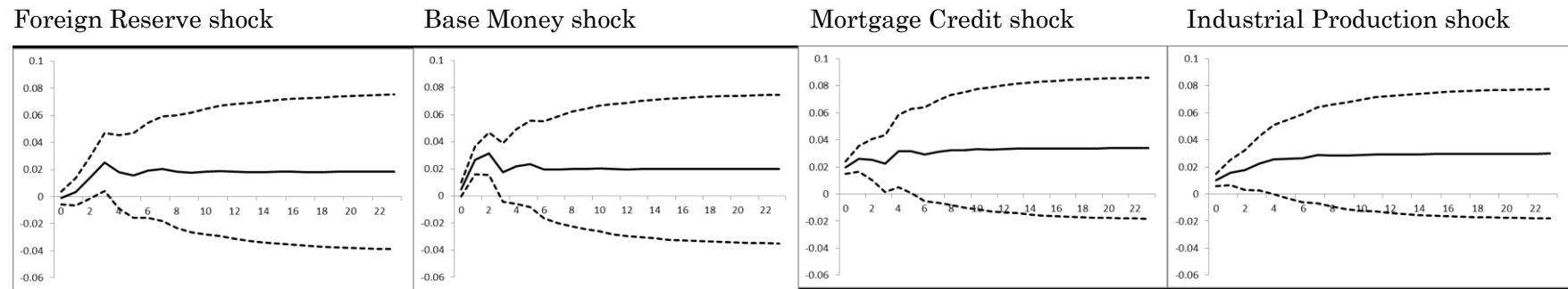| Foreign Reserve shock	Base Money shock	Mortgage Credit shock	Industrial Production shock

B: Beijing residential property price

Foreign Reserve shock	Base Money shock	Mortgage Credit shock	Industrial Production shock

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Table2 The forecast error decomposition

Variance decomposition of	Variance Decomposition (Percentage points)				
	Foreign Reserve	Base Money	Mortgage Credit	Indstrial Production	Residential Property Price
Overall	1.8407	31.1071	15.4373	3.5114	48.1038
Beijing	6.9185	16.2980	12.3979	3.9994	60.3862