Housing market in China's growth recovery and house price determination

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Abstract

This paper examines the role of housing market in China's growth recovery in 2009 and the determination of house prices in the current booming housing market. The global financial crisis 2007-2009 arose while policy-makers in China tried to prevent overheating of China's economy in 2007 by tightening monetary policy. While the western economies lack liquidity in their banking system, there was too much liquidity in the Chinese economy. To counter the adverse effect of the financial crisis on Chinese economy, policy-makers in China started a RMB 4 trillion stimulus package, and removed measures intended to slow down house price increase. The stimulus package went mainly to the fixed asset investment including the housing market. The investment in real estate is more than 11.5% of GDP in 2009; empirical analysis shows that the housing investment has a significant positive influence on the GDP growth. The house price in China seems to have decoupled from the economic fundamentals and its main determinants seem to be one period lagged house price and its percentage change.

The separation of house prices from the economic fundamentals suggests a bubble in the housing market. The main driving force of the house price increase at present is the expectation of continuing increase in house prices. The reluctance of central and local governments to let the house price drop, the belief in (urban) land as a scarce resource, past price trend in house prices, and loose monetary policy and difficulty in manufacturing all contribute to the continuing increase of house prices.

Keywords: House price; economic growth; financial crisis; GDP.

1. Introduction

The role housing market in China's growth rate recovery is closely related to the increase of house prices. On one hand, the booming housing market helped achieve an over 8% GDP growth rate; on the other hand, there are concerns about bubbles in the housing market. Many academics think that the price level has deviated too much from what economic fundamentals can justify. In the house price literature, it is generally believed that house price should reflect economic fundamentals at least in the long run.

Several studies have shown that economic fundamentals usually can explain changes in house price. Based on the US data, Mankiw and Weil (1989) found that demographic changes had important effect on the US house price and Capozza et al (2002) found city size, real income growth, population growth, and real construction costs have stable relationship with house price. Using Swedish panel data from1968 to 1994 Hort (1998) has made similar findings as those of Capozza et al (2002). McQuinn and O'Reilly (2008) used a panel data of 16 OECD countries from 1980 to 2005 and found that long-run house prices mainly reflects adjustment to improved fundamentals rather than speculative house price bubbles. Glindro et al (2008) found similar result using data from 1993 to 2006 in 9 Asia-Pacific economies. In contrast with the above studies, Gallin (2006) found no stable relationship between house price and economic fundamentals using 95 US MSA data from 1975 to 2002.

To explain why house prices deviate from economic fundamentals, researchers have explored different avenues. Muellbauer and Murphy (1997) found that UK financial liberalization of the mortgage market in the 1980s led to notable shifts in the house price behavior. Priemus (2003) demonstrated that the change of land policy has significantly affected the house price in the Netherland. Kiyotaki and Moore (1997) and Bernanke et al (1999) looked into the relationship between banking credit and asset prices (including house price). Collyns and Senhadji (2002) found that influence of credit growth to residential property price is contemporaneously significant in many Asia economies. According to the study of Goodhart (1995), the relationship between property prices and

credit growth is different in the US from in the UK. Gerlach and Peng (2005) argued that property prices influence bank credit instead of bank credit influencing property prices.

On the relationship between banking credit and house prices in China, Zhang et al (2006) and Liang and Cao (2007) found a relatively positive correlation coefficient between China's property prices and mortgage lending, while an increase in the mortgage lending rate can slow down the rise of property prices. Using Shanghai's monthly data, Tu and Zhang (2005) found the main determinants of Shanghai house price are one-period lagged house price, the ratio of real estate investment to fixed asset investment, FDI, and the variability of vacancy rate. Yu (2010) found there is no stable relationship between house price and economic fundamentals; house price has deviated upward from the economic fundamentals since government started macro-control of the real estate market in 2003. Yan et al (2009) found that short-run dynamics depend on changes of fundamentals and the adjustment process of housing market.

The measures by the Chinese governments in response to the 2007-2009 financial crisis has markedly increased banking lending in the economy, and a large amount of bank loans have flown into the real estate market. The extra liquidity from the government stimulus package is one cause of the house price increase in China during this global crisis. The 2007-2009 financial crisis led to recession in major western economies. The USA, UK, Germany, France and Japan have seen their economy shrinking in the third and fourth quarters of 2008. The recession continued in 2009 and the unemployment rate increased. When the crisis started at 2007, China was undergoing its one of fastest economic expansion, with a real GDP growth rate at 14.2%. After 5 year economic growth at over 10%, the economy was overheating and the inflation rate was picking up rapidly. To prevent further increase in inflation and bubbles in the economy, the People's Bank of China (PBOC), the central bank, implemented tight monetary policy to cool down the economy. PBOC raised the interest rate six times and the deposit reserve ratio 10 times in 2007 amid efforts to curb inflation and overheating economic growth.

The extra liquidity has been a chronic problem in China because of the large trade surplus and foreign direct investment. In 2006, the central bank had already raised three times the deposit reserve ratio. The tight monetary policy continued into 2008 with an increase in the required reserve ratio by half a percentage point to 15 percent as Jan 25 2008, when in major Western economies the central banks had been pumping liquidity into their banking system and cutting interest rates. The PBOC raised the deposit reserve ratio five times in 2008; the final increase in 2008 was announced on 7 June, to be effective on 25 June. The brief overview of the financial crisis and China's monetary policy shows that China and western economies entered the financial crisis at different stages of their business cycle. The aim of this paper is to analyze how the difference between China and western economies lead to a booming housing market in China which contributed to the growth recovery and may have led to a real estate bubble in China. The rest of the paper is organized as follows: Section 2 will examine the difference between Chinese and western economies when they encounter the crisis; Section 3 will look into the contribution of housing market in growth recovery; Section 4 will investigate the determination of house prices; and Section 5 concludes.

2. The difference between Chinese and the west economies when the crisis started

The most noticeable feature of the 2007-2010 financial/economic crisis is credit crunching (Mizen 2008). The lack of liquidity in the banking system causes banks reluctant to lend. To provide liquidity to the interbank market, the European Central Bank injected Euro 95 billion in overnight credit into the interbank market on August 9, 2007. The US Federal Reserve also injected US$ 24 billion to supply liquidity to the market. The Federal Reserve cut the discount rate to 5.75% on August 17. The British central bank, Bank of England, was initially reluctant to intervene. On September 14, 2007, a run on the deposits of the British bank Northern Rock began. The UK government was forced to guarantee all the savings in Northern Rock to stop the bank run spreading and the Bank of England had to pump in emergency money. On 18 September 2007, the Federal Reserve cut the discount rate by 50 basis points to 4.75%. The Federal Reserve announced the creation of the term auction facility (TAF), which would auction a fixed

amount of funds to the banking system, initially set at US$20 billion. The ECB lent European commercial banks $500 billion. The Bank of England made £10 billion available to UK banks. On 22 January 2008, the Federal Reserve cut the federal funds rate by 75 basis points to 3.50%. If the western governments and central banks had not provided the liquidity and financial assistance to the banking systems, many major banks would bankrupt and the whole financial system might collapse.

Even after the financial crisis started, the problem China faced was too much liquidity in the economy. Prominent in the economic activity in China are the fast economic growth and the high real estate price. Since the de facto peg of Chinese yuan to US dollar was replaced with a basket of currencies in 2006, although the appreciation of Chinese yuan caused difficulties of exporters in some sectors, the exports as a whole were still growing fast (at a slower pace than in 2004-2006). To prevent the yuan from appreciating too fast, the central bank has to buy the foreign currency and increase money supply in the economy. Excess liquidity became a major challenge for the government as it could result in asset bubbles and economic overheating. Because of the extra liquidity, there were both stock market boom and real estate market boom in 2007. The GDP growth rate, driven by the growth of exports and the real estate industry, was a staggering 14.2% in 2007. The Shanghai stock exchange composite index increased from under 1200 at the beginning of 2006 to around 6200 in October 2007. The consumer price index (CPI) also increased fast in 2007, so did the house price especially in some big cities, causing concerns that people would not be able to buy a flat in the city they work. The tightening of monetary policy in 2007 did not show an obvious effect on the economic growth rate or the real estate price increase even by June 2008, when the PBOC raised the deposit reserve ratio one more time. The growth rates in the first and second quarters of 2008 were still above 10%, and the increase in house price was still in its fastest pace. Obviously, China's economy was in a different stage of business cycle from those of major western economies. Different monetary policies are needed for the different stages.

Before the tightening of monetary policy by the central bank took effects in China, by the third quarter of 2008 the financial crisis in the US initiated by the subprime mortgage crisis in 2006 had let most major western economies slid into recession. The

pessimism and the credit crunching transmitted into the real economy because of the decreased demand. The decreased aggregate demand in major western economies reduced their demand for goods and services produced in China. The slowdown of the world economy has shown its impact on the Chinese economy. China's economy was growing by 9% in the fourth quarter of 2008 and the growth rate dropped to 6.1% in the first quarter of 2009, its weakest expansion since quarterly records began in 1992. The regions where export-oriented economy is important have been hit harder by the crisis. In the first quarter of 2009, Guangdong grew by 5.8%, Zhejiang by 3.4% and Shanghai by 3.1%. In recent years, exports have become an important driver in GDP growth. The reduction in exports lowers the GDP growth rate to below 10% in third and fourth quarter of 2008. With pessimistic views about the prospect of global economy, the increase in house prices slowed down in the third and fourth quarters of 2008. The house price dropped in real terms in the first and second quarters of 2009, which triggered complaints and price propping policies from the local governments in various cities.

Since major western economies experienced recession in later 2008, governments and central banks tried to use all policy tools at their disposal to prevent or attenuate the recession and rescue their troubled banking system. Sensing the adverse impact of a slowdown or recession on the Chinese economy, the government initiated a 4 trillion Chinese yuan stimulus package in order to insure the economic growth rate above 8%. Earlier policies to slow down the house price increase had been revoked to stimulate the housing demand. With the stimulus package, the house price recovered in the third quarter of 2009 and return to the fast price increase scenes. The real estate market seems to play an essential role in the economic development in China, especially in the more developed major cities and coast regions. The contribution of the real estate industry to the GDP growth is about 20% in 2009. It seems that investment in housing industry has more or less compensated the decrease in exports in 2009.

3. The contribution of real estate sector to the GDP

At the beginning of 2009, the house price reached its lowest level in recent years; the housing industry was pretty gloomy about the future. But with the stimulus package,

the sale volumes increased markedly with price increase. By the end of 2009, people started panicking buying because they were worried that house price would continue its increasing trend in the past 10 to 15 years. Within one year, the housing market from its low ebb rapidly turning into a boom. As one of engines for China's economic growth, the real estate industry plays an important role in insuring growth. In 2009, the sale volume of new and second-hand houses exceeded 6 trillion yuan, which is about 20% of the GDP in the same period. The investment in real estate reaches 3.6 trillion yuan, which is 19% of the fixed capital investment. The growth in the real estate investment constitutes 30% of the growth in fixed capital investment. New house sales equal to 13% of GDP in 2009, whereas in 2008 the new house sales were only 7.6% of GDP. Even in 2007, the new house sales were 10.4% of GDP, much lower than that in 2009. The commercial house floor area sold increased by 53% compared with last year with an increase in the total sales value 86.8%, among which commercial residential house floor area increased by 54.4% with an increase in sales value of 91.5%.

To investigate the relationship between GDP growth rate and the real estate investment, we use ordinary least square (OLS) method for estimating the parameters of the regression equation. The GDP growth rate data and housing industry investment data are from the database of National Bureau of Statistics. The EViews statistics software was used for carrying out the linear regression analysis.

In order to examine the contribution of real estate investment to GDP growth recovery, we did a regression analysis on the relationship between the GDP growth rate and the growth rate of housing industry investment. As shown in Fig.1, there is a good correlation between the two growth rate. The results of regression analysis in in Table 1.
As shown in Table 1, the housing industry investment has a very significant influence on the GDP growth rate. For each one percent increase in the housing industry, there will about 0.188 percentage point increase in the GDP. Therefore, increasing investment in the real estate sector is a reliable way of stimulating the economic growth in China. The Durbin-Watson test (D=0.494806) indicates that there is serial correlation in the observations. Breusch-Godfrey serial correlation LM Test also suggests the existence of serial correlation (Obs R^2=11.41866, p<0.003315).

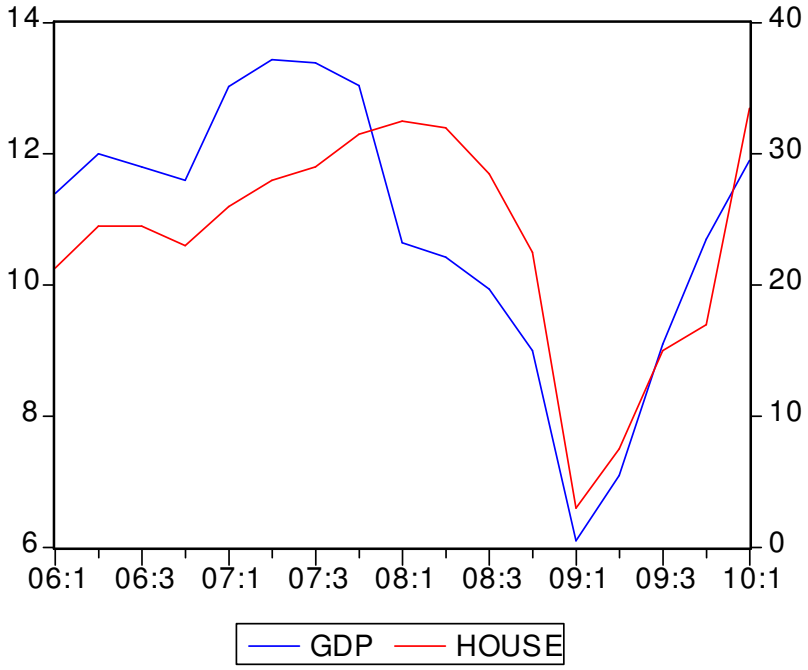

Fig.1 The relationship between the GDP growth rate and the housing investment growth rate. GDP, GDP growth rate; House, housing growth rate. The left Y-axis is percentage change for the GDP, and the right Y-axis is percentage change for the housing investment. The x-axis label is quarter of the year. Data source: National Bureau of Statistics.

Table 1 The estimators of GDP growth and the housing investment growth between 2006Q1 and 2010Q1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.453276	1.000239	6.451734	0.0000
HOUSE	0.187579	0.040101	4.677672	0.0003
R-squared	0.593282			
Adjusted R-squared	0.566168			
F-statistic	21.88062			
Prob(F-statistic)	0.000298			
Sample:	17			
Durbin-Watson stat	0.494806			

To remedy the serial correlation problem, the lagged GDP growth rate and housing investment growth are included in the regression equation as independent variables. Table 2 shows the results of the estimation.

Table 2 The estimators of GDP growth rate and housing investment growth rate with lagged variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.598567	1.233302	1.296168	0.2193
HOUSE	0.116222	0.038242	3.039154	0.0103
GDP(t-1)	0.947629	0.189887	4.990477	0.0003
HOUSE(t-1)	-0.163927	0.040849	-4.012972	0.0017
R-squared	0.878396			
Adjusted R-squared	0.847995			
F-statistic	28.89373			
Prob(F-statistic)	0.000009			
Sample:	16			

With lagged variables on the right-hand side of the regression equation, the Durbin-Watson test no long applies. The Breusch-Godfrey serial correlation LM Test does not reject the null hypothesis that there is no serial correlation (Obs R^2=2.393647, p<0.302152). When the lagged variables are included as independent variables, the lagged GDP growth rate has a positive impact on the current GDP growth rate. The current housing investment growth still has a positive effect on the GDP growth rate, with about 0.12 percentage point increase in GDP for each percentage increase in housing investment. But the lagged housing investment has a negative effect on the GDP growth rate, probably because previous period investment in houses reduces funds available for current consumption and investment.

4. The house price determination

In examining the real estate price trend in China, two facts stand out. One is that the house price hardly ever decreased since the market-oriented housing reform in 1998.

The other is that the government (the prime minister Wen Jiabao) stated objective in regulating the housing market is to prevent too fast increase of house prices in some cities. Although researchers have identified some cities with housing market bubble in 2003-2005, those cities tend to witness the fastest price increases in recent years. Hui and Shen (2006) found that house price bubbles existed in Shanghai in 2003. In the past 10 years, the house price has deviated from the economic fundamentals (Yu 2010), and seems to follow its own path of evolution. In this paper, the two features of house price in China (continuous increase and government protection on downward movement) will be modeled by a stochastic process with downward protection.

Since the house price P is no longer determined by economic fundamentals, we assume that the process governing P is a geometric Brownian motion with function form

$$dP = aPdt + \sigma PdB$$

In the above equation, a is the instantaneous percentage change in house price per unit time, σ is the house price volatility; t is time and B is a Brownian motion representing the risk source. This stochastic differential equation will generate both price increases and decreases. To describe the price changes in the Chinese housing market from 1998 up to now, we need an equation that can give nearly one directional movement. The stochastic equation with government policy guarantee to move only upward is

$$dP = \max[0, aPdt + \sigma PdB]$$

The effect of the max function is to insure that investors in the housing market will never lose money. The risk in this market is how much money an investor will make. Essentially when the government is reluctant to see any price drop in the house market, the only direction of house price change is upward, and this is a government put option for investors in the housing market. Once a put option given to investors for free, the property bubble bound to form. And the larger the bubble becomes, the less willing the government will prick the bubble to deflate it. The government will use its monetary and fiscal policy to prop up the housing market, such that interest rates no longer determine

the house prices. Rather interest rates become a tool to insure no downward price movement. When the bubble forms and gets bigger, the house price acquired a life of its own and its price change can be largely explained by positive feedbacks from its own price change. In the following, we tested whether house price movements can be largely explained by its own movement in previous periods. We consider the following regression

$$P_t = \beta_1 + \beta_2 P_{t-1} + \beta_3 \frac{\Delta P_{t-1}}{P_{t-1}}$$

P_t is the house price (index) at time *t*, and β_1, β_2 and β_3 are the regression coefficients. We constructed the time series of house price index from the data of National Bureau of Statistics of China. Table 3 is the regression results.

Table 3 The estimator of house price determinants between 2004Q1 and 2010Q1 with lagged house price and its percentage change as independent variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-2.874232	0.493673	-5.822142	0.0000
P(t-1)	1.022423	0.003867	264.3915	0.0000
ΔP(t-1)/P(t-1)	1.264834	0.026373	47.96033	0.0000
R-squared	0.999700			
Adjusted R-squared	0.999671			
F-statistic	34992.47			
Prob(F-statistic)	0.000000			
Sample size:	24			

From the results of Table 3, it is clear that the lagged variable and the lagged percentage change explained almost all the changes in the house price P. All the estimators are very significant. We have also tested including other variable such as GDP growth rate, which have a smaller but significant effect on house price (see Table 4). Adding lagged GDP growth rate without contemporary GDP growth rate has no significant effect on house price.

Table 4 The estimator of house price determinants between 2004Q1 and 2010Q1 with GDP growth rate, lagged house price and its percentage change as independent variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-3.647653	0.575803	-6.334899	0.0000
P(t-1)	1.023634	0.003602	284.1472	0.0000
GDP	0.061239	0.027999	2.187180	0.0408
ΔP(t-1)/P(t-1)	1.244579	0.025982	47.90077	0.0000
R-squared	0.999758			
Adjusted R-squared	0.999722			
F-statistic	27533.18			
Prob(F-statistic)	0.000000			
Sample size	24			

The results in Tables 3 and 4 suggest that the movement of house price is mainly driven by the buyers' belief that house price in China will not decrease rather than changes in economic fundamentals. This belief has been correct since the housing reform in 1998, and each time when the housing market became bearish, the government would step in to prop up the market. The bearish predictions have nearly always been wrong and prospective buyers waiting for price decrease have usually lost out. Will this pattern of house price change continue in future or in next five years? It seems unlikely. In the long run, all investments should have the same rate of return, and the return should be based on the cash flow the asset generates. When the house price stops rising and the rent a property generates cannot justify its price, the housing market bubble will burst. The price dynamics of housing market described in this study suggests the existence of housing market bubbles. The simple criterion to judge whether there is housing market bubble is whether people buy a property because they need to live in it or because they can make money out of it. If people's main motive to buy a house is to sell it for a profit or to keep it for future need because price will increase, there must be a bubble in the housing market.

The current situation is mainly a consequence of government policies and activities at different levels. In one sense, it is because of government competing with private sectors and ordinary household for profits/benefits. The monopoly of land supply

and land-use right transfer and incomes generated from the monopoly make it very difficult for the government not to prop up the housing market, which results in the belief that house price will never decrease and the worst scenario for the buyers is not making that much profit. When there is an effective guarantee from the government that the house price will not go down, the house buyers have got a free put option, the "government put". Although the government has failed in all its previous efforts in stabilizing the housing market, it has started another round of efforts, we need to wait and see its outcome. If the Chinese government continues to control land use right assignments and provide de-facto downside protection for housing investment, house prices may rise further and contribute to the economic growth until a bubble forming and bursting. The right policy approach toward a housing market bubble in China is to remove ambiguities in property rights and land use rights concerning real estate investment, and charge higher marginal tax on land use or property to promote efficient uses of scarce land resources.

5. Discussion and conclusion

This paper has examined the different situations when China and western economies encountered the 2007-2009 financial crisis. While the western economies lack liquidity in their banking system, the PBOC had been fighting inflation and tried to control the extra liquidity in the economy. Although they were different stages of their business cycles, they adopted similar approaches in dealing with the crisis. The main problem faced by the Chinese policymakers during the crisis was to make up the decreased demand from abroad, not a shortage of liquidity. Since there was no shortage of liquidity and the demand for Chinese exports was low in 2009, the stimulus package largely went to the fixed asset investment and housing market. The demand for houses stimulated housing industry investment and helped the recovery of GDP growth rate. The main effect of the booming housing market is to compensate the negative effect of decrease in exports due to recession in major western economies.

Empirical analysis shows that an increase in housing investment can significantly increase the GDP growth rate. This result is understandable, because housing investment

is part of GDP. An increase in its part will increase the whole. How such stimulus package will influence the economy in the long run is still not certain. The government pumped into the economy so much credit when the economy might not necessarily need it.

The house price in China may be described by a stochastic differential equation where the downward change has been protected. The downward protection is provided by the government reluctant to let the house price drop. Since there is no downward risk, investors are more risk loving in the housing market. Because of the belief that the house price will not drop or the government will not let the house price drop, the house price has separated from economic fundamentals. The main determinants of house price are the one-period lagged house price and its percentage change. This result indicates that a bubble exists in the housing market. The main driving force of the house price increase at present is the expectation of continuing increase in house prices. The reluctance of central and local governments to let the house price drop, the belief in (urban) land as a scarce resource, past price trend in house prices, and loose monetary policy and difficulty in manufacturing all contribute to the continuing increase of house prices.

In conclusion, an increase in housing investment can significantly increase the GDP growth rate. The Chinese government pumped credit into the economy when there seemed to be enough liquidity. Because of the belief that house price will not drop, homebuyers in China are more risk loving and the house price has separated from the economic fundamentals. The house price is mainly determined by one-period lagged house price and its percentage change, which indicates the existence of a bubble.

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