Interrelationship between Foreign Investment and Real Estate Price Bubble: Evidence from 35 Major Cities in China

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***Abstract*— Recently the effect of foreign investment in real estate market is highly concerned and widely discussed in China, especially its effect on real estate price. Most existing literatures concluded in a positive interrelationship between them, and so believed that the rapidly increased foreign investment in real estate market is one major cause of the emerging real estate price bubbles. But in this paper, we define price bubble as the deviation between actual real estate price and its equilibrium level, and then empirically investigate the relationship between the proportion of foreign investment in real estate development and the degree of real estate price deviation, using the panel data from 35 major cities in China, from 1999 to 2006. It is found that the effects of foreign investment are twofold. On one hand, holding other factors constant, foreign investors prefer to invest in the "overpricing" cities where real estate price bubbles have already existed, in order to benefit from the irrational price growth in such cities. But on the other hand, the effect of such speculation activities on the degree of price deviation is rather limited. So foreign investors did get benefit from the existing real estate price bubbles in the market, but there is not evidence that they caused the price bubbles or promoted them.**

Keywords- Foreign Investment, Real Estate Price Bubble, Panel Data, China

I. INTRODUCTION

The real estate industry is the second largest sector for foreign direct investment in China. As shown in Figure 1, its share in the total amount of foreign investment keeps around 10%. Especially in the last few years, because of the booming real estate markets in most Chinese cities and the RMB appreciation, the amount of foreign investment in real estate sector has been increasing rapidly. As shown in Figure 2, the annualized growth rate of foreign investment in real estate development reached as high as 23.79% from 2001 to 2006. And in 2006, the amount exceeded the record before the Asian finance storm. Besides, the foreign investment in real estate sector has spread to much more cities, instead of concentrating on few "super-star" cities. For example, in 1999 the four top cities of Beijing, Shanghai, Guangzhou and Shenzhen accounted for 67.86% of the total amount of foreign investment in real estate development, but their share dropped to only 32.52% in 2006.

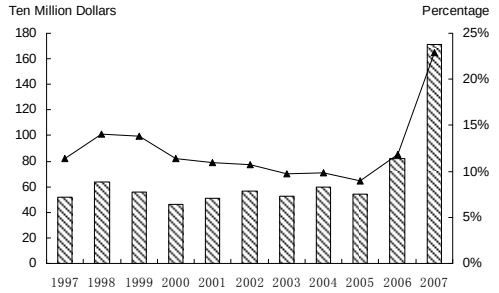

Figure 1. Foreign Direct Investment in Real Estate Sector in China and its Share (1998-2006)

Sources: *China City Statistics Yearbook.*

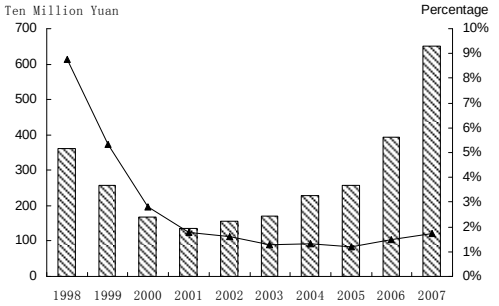

Figure 2. Foreign Investment in Real Estate Development in China and its Share (1998-2006)

Sources: *China Real Estate Statistics Yearbook.*

In such circumstance, the influence of foreign investment on real estate market, or even on the nationwide macro-economics, has become a hot topic in China. However, while researchers always emphasize the benefits of foreign investment in other sectors (for example, the manufactory industry), most medias and researches tend to focus on the negative effects of foreign investment in real estate sector. Especially, it is widely accepted that foreign investment leads to the rapid increase of real estate price, and is one important cause for the emerging real estate price bubbles in several overheated markets in recent years. Accordingly, they believe that the foreign investment in real estate sector is

harmful and so suggest a more rigorous regulation on them.

This paper also focuses on the interrelationship between foreign investment in real estate market and real estate price, but contributes to the existing literatures in two aspects. Firstly, the deviation between actual real estate price and its equilibrium level is taken as the proxy of real estate price bubble in this paper, instead of just focusing on the level or growth rate of real estate price. And then the interrelationship between price deviation and foreign investment is analyzed empirically. So it is possible to investigate the effect of foreign investment on price bubble more accurately. Secondly, besides the effect of foreign investment, the determinants of foreign investors' decision making process are also analyzed. So it is possible to investigate the intentional behaviors of the foreign investors. Accordingly, the research in this paper can help better understand the effect of the foreign investment in real estate market, especially for policy makers.

Foreign investors can invest in real estate market in various ways, and they may have different features or effects. In this paper, we just focus on the foreign investment in real estate development, which is the largest and most important sector for foreign investment in China at present (Wen and Liu, 2005). Besides, the statistics about real estate development is also more reliable at present, which is important for the empirical study.

The remainder of this paper is organized as follows. The theoretical analysis is provided in the next section, based on a brief literature review. The empirical methods and the panel data set to be used in the empirical analysis are described in Section 3, while the empirical results and discussions are provided in Section 4. The concluding remarks appear in the last section.

II. Theoretical Analysis and Hypotheses

There have been a large number of researches on the interrelationship between foreign investment and real estate price in China, while most of these researches focus on the effect of foreign investment on the level or growth rate of real estate price. Besides the theoretical researches based on the theory of international trade (Meng and Li, 2006; Gao, 2007) and the case studies based on Japan, Thailand and so on (Tao, 2006), there are also numerous empirical studies on this topic. As listed in Table I, the major findings of these researches are generally consistent, which always conclude in a positive interrelationship: a larger amount of foreign investment in real estate market leads to a higher real estate price or a faster growth, which then attracts more foreign investors in turn. Based on such findings, the researchers believe that the rapidly increased foreign investment in real estate market is (at least) one of the major causes of the emerging real estate price bubbles in several overheated markets in recent years.

Table I. BRIEF SUMMARY OF EMPIRICAL RESULTS ON INTERRELASIONSHIP BETWEEN FOREIGN INVESTMENT AND REAL ESTATE PRICE

Research	Data	Findings
PBC Shanghai , 2004	Monthly data, 1999-2004, Shanghai	The amount of capital inflowing to the real estate market and the real estate price are Granger causes for each other.
Wu and Zhu, 2006	Cross-section data, 1999, 31 provinces	The composition of the sources of real estate investment can significantly affect real estate price. Especially, a higher share of foreign investment leads to a higher real estate price.
Song and Gao, 2007	Quarterly data, 1998-2006, Nation-level	In the short run, the increase of real estate price attracts more foreign investment. And in the long run, the foreign investment causes the price to increase to a larger extent.
Liang and Cao, 2007	Monthly data, 1998-2005, Nation-level	Increase in foreign investment leads to an increase in real estate price in the next month. And increase in real estate price will firstly decrease, and then increase the amount of foreign investment.
Yan, 2007	Yearly data, 1987-2005, Nationwide	Foreign investment can cause the increase of real estate price, although such effect is limited compared with the effect of GDP growth.

But such conclusions are still questionable, because these researches do not properly define the "real estate price bubble", and do not measure the degree of price bubble accurately either. In fact, as widely accepted in the field of real estate economics, real estate price bubble should be defined as a situation in which the actual real estate price significantly exceeds its equilibrium level determined by the fundamentals (Himmelberg *et al*, 2005; Smith and Smith, 2006; Haines and Rosen, 2007). According to such definition, high price level alone is not a sufficient condition in judging price bubble, while price growth rate is not an accurate measurement of the degree of price bubble. Instead, the deviation between actual real estate price and its empirical level is the only reliable indicator in judging or measuring real estate price bubble (Smith and Smith, 2006; Haines and Rosen, 2007).

Accordingly, even if the positive relationship between foreign investment and real estate price level (or growth rate) suggested in the above literatures does exist in China, such evidences are not enough for us to ascribe the price bubble to

foreign investment. Instead, such positive interrelationship can have two completely different explanations. On one hand, the mean reversion mechanism is an important feature of real estate price series (Abraham and Hendershott, 1996; Capozza *et al*, 2004), which is also proved to work in China's real estate market at present (Wu and Liu, 2007). And as a result, if the present real estate price level is significantly below its equilibrium level, the actual real estate is more likely to move towards the equilibrium level and so undergo a rapid growth in the near future. Thus, one possible explanation for the positive relationship is that foreign investors can discover such "underpricing" cities and invest in these cities, and then benefit from the later price growth. In this condition, the foreign investment can lead to a smaller price deviation, so it is harmless, or even helpful for the market (improving the market efficiency).

But there is also a second possible explanation. In a city where price bubble has already existed, real estate price also always grow quickly until the bubble bursts, because of the irrational expectation and behaviors of the market participants. So it is also possible for foreign investors to invest in such "overpricing" cities, or even anticipate in the speculation in the market, in order to benefit from the irrational price growth. In this condition, the foreign investment leads to a larger price gap, and so such speculation is harmful and should be restricted.

Accordingly, it is not enough to just focus on the relationship between foreign investment and price level or growth rate, and a further analysis on the relationship between foreign investment and price deviation should be more meaningful. So here two testable hypotheses are provided based on the theoretical analysis before, which will be testified in the following empirical researches.

Hypothesis 1*: Foreign investors tend to invest in cities where the present actual real estate price is below its equilibrium level, and their investment then leads to a decrease of the deviation.*

Hypothesis 2*: Foreign investors tend to invest in cities where the present actual real estate price is above its equilibrium level, and their investment then leads to an increase of the deviation.*

III. Methodology and Data

A. Models for Empirical Analysis

The empirical research is conducted in the following three steps.

I) Estimating of the Price Deviation

Unlike the real estate price level or growth rate, the degree of price deviation cannot be directly observed in the market. So it is necessary to estimate the equilibrium price equation and then calculate the degree of price deviation based on the fitted equilibrium price. Similar with most existing literatures (Quigley, 1999; Himmelberg *et al*, 2005), a reduced form panel data model of real estate price is employed here, where the equilibrium value for real estate price is assumed to be determined by exogenous economic and social conditions of the city. That is:

$$P_{it} = f(X_{it}) \tag{1}$$

Where: P_{it} is the actual real estate price for city i in period t; X is a vector of exogenous explanatory variables.

Then the empirical real estate prices (P_{it}^{*}) of each city in each year can be fitted based on the coefficients resulted, and the price deviation (PD_{it}) is calculated as:

$$PD_{it} = (P_{it} - P_{it}^{*}) / P_{it}^{*} \bullet 100\% \tag{2}$$

II) Determinants in Foreign Investors' Choices

Then the determinants in foreign investors' choices of cities for investment are analyzed, focusing on the effect of real estate price deviation. A panel data model is estimated, with the proportion of foreign investment in each city in each year ($FINVEST_{it}$) as dependents. And in the group of independents, besides the degree of price deviation (PD_{it}), there are also some variables included in order to control for the effect of other factors. Firstly, besides the price deviation, the future real estate price growth is also affected by the fundamentals, so some city-level economic and social factors are included. Secondly, the degree of economical dependence on international trade ($ITRADE_{it}$) is included as the proxy of the degree of city's openness, which has been proved to explain the difference in foreign investment in real estate sector between various cities to a significant extent (Zhang, 2006). Finally, because of the long duration of real estate development, the amount of foreign investment can be expected to be highly serial correlated, so the autoregressive term is also included. Thus, the model is:

$$FINVEST_{it} = f(PD_{it}, X_{it}, ITRADE_{it}, FINVEST_{i,t-1}) \tag{3}$$

In this model, the coefficient of the price deviation term (PD_{it}) is most important. If it were significant and negative, Hypothesis 1 would be testified; if it were significant and positive, Hypothesis 2 would be testified. Besides, if the coefficient were insignificant, it would be suggested that foreign investors cannot accurately observe the price deviation or do not take it as an important factor in their decisions.

III) Effect of Foreign Investment on Price Deviation

The second question we are concerned is whether foreign investment will affect the degree of real estate price bubble, so finally a second panel data

model is estimated in order to discuss the determinants of price deviation. The dependent is the price deviation (PD_{it}). And in the group of independents, besides the variable reflecting foreign investment ($FINVEST_{it}$), the lagged term of price deviation is also included to capture the effect of serial correlation mechanism. So the model is:

$$PD_{it} = f(FINVEST_{it}, PD_{i,t-1}) \quad (4)$$

In this model, the coefficient of the foreign investment term ($FINVEST_{it}$) is most important. If it were significant and negative, Hypothesis 1 would be testified; if it were significant and positive, Hypothesis 2 would be testified. Besides, if the coefficient were insignificant, it would be suggested that foreign investment cannot significantly affect the degree of price bubble in the real estate market.

B. Data Description

The data used in this study is a panel data set covering 35 major cities in China, for the 8 years from 1999 to 2006. The variables in the data set include three major groups.

I) Foreign Investment Proportion

As mentioned in the first section, in this paper we just focus on the foreign investment in real estate development. So the proportion of foreign investment in the total amount of real estate development in each year in each city is taken as the proxy of the degree of foreign investment's participation in real estate market. This series are provided by the National Bureau of Statistics of China and reported in the "*China Real Estate Statistics Yearbook*".

II) Real Estate Price

The average transaction real estate price series reported by the National Bureau of Statistics of China is employed in this paper as the price indicator. It is not a constant-quality real estate price indicator, but it is still the most reliable real estate price indicator in China at present, because of its long history and extensive coverage of cities. The prices are deflated by the CPI series in each city, and so are measured in 1999 values.

III) City Attributes

Several major city attributes are also included as independents in the models, such as GDP (*GDP*), average disposal personal income (*INCOME*), unemployment rate (*UNEMP*), international trade volume (*ITRADE*), and so on. All the series are reported by the National Bureau of Statistics of China. And the variables of *GDP*, *INCOME* and *ITRADE* are all deflated by the CPI series in each city and measured in 1999 values.

IV. Empirical Results and Discussions

A. Estimating of the Price Deviation

A panel data model as shown in Eq.(1) is firstly estimated for the equilibrium level of real estate price. The independents include GDP (*GDP*), average disposal personal income (*INCOME*) and unemployment rate (*UNEMP*). The results are listed in Table II.

Table II. DETERMINANTS OF THE EQUILIBRIUM REAL ESTATE PRICE (35CITIES, 1999-2006)

Dependent: Ln (*P*)

Variable	Coefficient (t stats.)
Intercept	-0.33 (-1.03)
Ln(*GDP*)	0.30 (8.00***)
Ln(*INCOME*)	0.59 (9.39***)
Ln(*UNEMP*)	-0.15 (-5.70***)
Adjust R^2	0.77

Notes: ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

The model has a strong explanation power of real estate price, while the independents included all have reasonable coefficients and are significant. Real average real estate price is positively related to GDP and real disposal personal income, and are negatively related to unemployment rate. Then the coefficients can be applied to fit the equilibrium price in each city in each year, and then calculate the price deviation according to Eq.(2). Table III provides a summary of the degrees of price deviation in each year.

Table III. DESCRIPTIVE STATISTICS OF REAL ESTATE PRICE DEVIATION IN EACH YEAR

	Mean	St. Dev.	Max.	Min.
1999	6.52%	23.20%	73.86%	-28.96%
2000	0.70%	17.78%	40.03%	-31.73%
2001	2.27%	19.11%	45.84%	-33.61%
2002	1.74%	15.03%	33.39%	-21.96%
2003	0.57%	16.95%	45.26%	-32.60%
2004	-2.64%	16.67%	36.29%	-40.77%
2005	-1.47%	17.74%	48.76%	-40.69%
2006	2.14%	19.58%	49.18%	-39.41%

B. Determinants in Foreign Investors' Choices

Then the panel data model as shown in Eq.(3) is estimated to analyze the determinants in foreign investors' choices of investment orientation. The dependents and independents are discussed in last section, and the results are listed in Table IV.

The models have strong explanation power of foreign investors' behaviors, especially when the lagged term of investment proportion is included (Model V and Model VI). All the variables included are significant and have the expected sign. Foreign investors prefer to invest in cities with developed economics (*GDP*) and open environment (*ITRADE*/*GDP*). Especially, the variable of lagged price deviation, $PD_{i,t-1}$, is significantly positive at

least at 10% level in the models, and according to the coefficient in Model V, if the price deviation in one city increased by 1% in some year, the proportion of foreign investment in real estate development in this city could also be expected to increase by about 1% in the next year, holding other factors constant. Even when the year fixed effects are included to control for the effect of nationwide fluctuation of foreign investment (Model VI), the coefficients generally keep consistent.

These findings indicate that, foreign investors tend to invest in cities where actual real estate prices have exceeded their equilibrium levels, or in other words, they prefer to invest in the overheated cities where real estate price bubbles have already existed, which testifies Hypothesis 2. And in this sense, the foreign investors can be referred as speculators, rather than investors.

Table IV. DETERMINANTS OF THE PROPORTION OF FOREIGN INVESTMENT (35CITIES, 2000-2006)

Dependence: Ln (*FINVEST*)

	Model I	Model II	Model III	Model IV	Model V	Model VI
Intercept	2.03(7.99***)	1.78(7.94***)	0.71(2.23**)	0.71(2.81***)	0.32(2.32**)	0.33(2.34**)
PD(-1)	6.28(4.51***)			3.57(3.20***)	1.00(1.64*)	1.05(1.68*)
GDP (-1)		157.6(10.06***)		135.5(9.50***)	42.51(4.97***)	42.91(4.92***)
ITRADE/*GDP*			2.67(7.34***)	1.90(6.53***)	0.33(1.93*)	0.31(1.80*)
FINVEST(-1)					0.70(24.39***)	0.70(24.04***)
Year Fixed Effect	No	No	No	No	No	No
Adjust R^2	0.07	0.29	0.16	0.43	0.84	0.83

Notes: ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

C. Effect of Foreign Investment on Price Deviation

Since foreign investors have been proved to prefer to cities with real estate price bubble, a second question we are concerned with is whether such investment (or speculation) will leading to a larger price bubble. So finally the panel data model shown in Eq.(4) is estimated, and the results are listed in Table V.

Table V. DETERMINANTS OF THE REAL ESTATE PRICE DEVIATION (35CITIES, 2000-2006)

Dependence: Ln (*PD*)

	Model I	Model II	Model III
Intercept	-0.02 (-1.35)	-0.00 (-0.54)	-0.01 (-1.15)
FINVEST(-1)	0.01 (4.30***)		0.00 (1.60)
PD(-1)		0.77 (20.95***)	0.75 (19.89***)
Adjust R^2	0.07	0.64	0.64

Notes: ***: significant at the 1% level; **: significant at the 5% level; *: significant at the 10% level.

As shown in the table, the variable of lagged proportion of foreign investment, *FINVEST*(-1), is positive, which also testifies the expectation in Hypothesis 2. However, such effect is limited and insignificant, especially when the serial correlation of the price deviation is considered (Model III). According to the coefficient in Model I, if the proportion of foreign investment in one city increased by 1% in some year, the price deviation could only be expected to increase by about 0.01% in the next year, holding other factors constant, which is almost neglectable.

So as a conclusion, although the investment (or rather, the speculation) by foreign investors tends to enlarge the degree of price deviation, such effect is rather limited and insignificant. Accordingly, it can be suggested that foreign investment is not a major cause in the formation or expansion of real estate price bubble.

V. Conclusions

The effect of foreign investment in real estate market is a hot topic in China at present. Instead of just focusing on the real estate price level or growth rate as most existing literatures in China, in this paper we take the deviation between actual real estate price and its equilibrium level as the proxy of real estate price bubble, and empirical analyzes its relationship with the proportion of foreign investment in real estate development, using data collected in 35 major cities, from 1999 to 2006. The results indicate that, the effects of foreign investment are twofold. On one hand, when holding other factors constant, foreign investors prefer to invest in the "overpricing" cities where real estate price bubbles have already exists, in order to benefit from the irrational price growth in such cities. But on the other hand, the effect of such speculation activities on the price deviation is rather limited. So in one word, foreign investment get benefit from the existing real estate price bubble in the market, but there is not evidence that they caused the price bubble or promoted it.

REFERENCES

[1] Abraham J M, Hendershott P H. “Bubbles in Metropolitan Housing Markets”, *Journal of Housing Research*, 1996, 7(2).

[2] Capozza D R, Hendershott P H, Mack C. “An Anatomy of Price Dynamics in Illiquid Markets: Analysis and Evidence from Local Housing Markets”, *Real Estate Economics*, 2004, 32(1).

[3] Gao T. *Infection of the Foreign Capital in Chinese Real Estate Market and Empirical Research*, Zhejiang University: Master Degree Dissertation, 2007. (in Chinese)

[4] Haines C L, Rosen R J. “Bubble, Bubble, Toil, and Trouble”, *Economic Perspectives*, 2007, (31).

[5] Himmelberg C, Mayer C, Sinai T. “Assessing High House Prices: Bubbles, Fundamentals, and Misperceptions”, *Journal of Economic Perspectives*, 2005, 19(4).

[6] Liang L, Cao C. “Empirical Study on the Effect of FDI on Real Estate Price”, *China Price*, 2007, (3). (in Chinese)

[7] Meng X, Li C. “Effect of International Capital Flow on Real Estate Price in China”, *Forum of World Economics & Politics*, 2006, (6). (in Chinese)

[8] PBC Shanghai. “Foreign Investment in Real Estate Market in Shanghai and its Influence”, *Shanghai Finance*, 2004, (11). (in Chinese)

[9] Quigley J. “Real Estate Prices and Economic Cycles”, *International Real Estate Review*, 1999, 2 (1).

[10] Smith M H, Smith G. “Bubble, Bubble, Where's the Housing Bubble”, *Brookings Papers on Economic Activity*, 2006, (1).

[11] Song B, Gao B. “Influence of International Capital Flow on Housing and Land Price: Positive Test Based on the data in China”, *Research on Financial and Economic Issues*, 2007, (3). (in Chinese)

[12] Tao M. “Effect of Foreign Investment in Real Estate Market and Policy Analysis”, *Social Sciences in Nanjing*, 2006, (11). (in Chinese)

[13] Weng S, Liu H. “The Involvement and Influence of the Foreign Investment in China s Real Estate Industry”, *Construction Economy*, 2005, (9). (in Chinese)

[14] Wu J, Liu H. “The Equrilibirum Housing Price Level: Evidence from 36 Major Cities”, *Reform*, 2007, (4). (in Chinese)

[15] Wu L, Zhu P. “Relationship between Real Estate Price and Capital Structure”, *Modern Economic Science*, 2006, 28(1). (in Chinese)

[16] Yan Z. “Empirical Study on the Effects of GDP and FDI on Real Estate Price”, *Economic Research Guide*, 2007, (1). (in Chinese)

[17] Zhang H. “Analysis on Foreign Investment in Real Estate Market in Shanghai”, *China Real Estate Research*, 2007, (4). (in Chinese)

[18] Zhang L. *Empirical Study on Foreign Real Estate Investment Environment in Tianjin*, Hebei University of Technology: Master Degree Dissertation, 2006. (in Chinese)

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