

Local Government-led Investment and Real Estate Markets in China

Abstract: To optimize total revenue, local governments in China provide industrial land at a low cost for an offset of future tax revenue (belonging to general fiscal revenue) and for local economic development, while limiting the supply of commercial and residential land to raise land leasing prices and thus extra-budgetary revenue. These are the essential contents of “land fiscal revenue”. Local governments expand debts from banks through their underlying local government financing vehicles by land mortgage to develop industrial zones and parks. This process, known as “land finance”, attracts industrial and thus commercial investment and further increases real estate prices. Banks provide funds to facilitate real estate investment, and real estate development enterprises translate high land cost into much higher housing prices in a seller’s market. Led by local government, banks and real estate development enterprises forge a coalition on real estate investment and the facilitation of real estate price appreciation. Soaring housing prices attract speculation from private and foreign funds, further increasing housing price levels. With annual data from 2003 to 2011, a panel VAR model further shows that land leasing and real estate prices positively affect local government general fiscal revenue, while land leasing negatively influences real estate prices. Based on quarterly data from 2003: 2Q–2012: 4Q, three VAR models find that bank credit, and private and foreign funds have strong positive effects on housing prices; of these, house purchase loans have the largest effect. Housing prices also have a strong positive impact on speculation in real estate from private funds and hot money.

Keywords: Investment in real estate, local governments, bank credit, private funds, foreign funds

1 Introduction

Since the 1998 reform of the housing market in China, investment in real estate has increased, particularly since 2003. Investment by real estate development enterprises rose from 361.4 billion RMB in 1998 to 1,015.3 billion RMB in 2003, and subsequently sharply increased to 7,180.4 billion RMB by 2012¹. In addition to real estate development enterprises (suppliers), individuals and institutions (customers) contributed to the real estate investment increase². This was because of the expectation that there would be a dramatic rise in housing demand and thus house prices accompanying urbanization development. Real estate was a desirable investment financially because of a lack of investment goods in China. More and more customer funds were invested in real estate in search of house price appreciation profits, such as the Wenzhou house speculation groups³. Such excessive investment, particularly speculative demand, led to an overheated real estate industry and thus boosted the housing price upswing. This is known as a “bubble”.

There was excessive investment in real estate in Japan during the 1980s Japanese bubble period and in American during the 2000s bubble period; however, the Chinese real estate market is unique. The Chinese real estate market behaves differently from the US or the UK markets because of differences in the political environment, legal systems, and culture, as Wang and Wang (2012) point out. One important difference is that all urban land in China is owned by the state, and local governments have a strong influence on the real estate market by controlling land release and granting development rights. Liu et al. (2008) state that in recent years local governments in China have significantly increased their land development by acquiring land from farmers and leasing it on a large scale to industrial and commercial developers. They argue that local land development has contributed to an investment-driven growth in China that is not sustainable in the long run. Based on panel data covering all provinces from 1998 to 2005, they find that the impact of public land leasing stimulated local fiscal revenue and gross domestic product. Liu et al. (2012) also point out that the local state-dominated model of administrative urbanization in China differs markedly from the urban growth model in Western nations. Land-based urban development can rapidly produce dramatic economic and urban outcomes, but whether these are beneficial to the urban and rural residents is not clear. In China, both investment-driven growth (Liu et al., 2008) and administrative urbanization (Liu et al., 2012) are based on land and are led by local government. It seems that local government led land-based investment or development accompanying urbanization drove growth in China. Lai (2008) asserts that there was very excessive infrastructure and real estate investment in China from 2003 because of the inappropriate growth strategy. Under this complex and unique context, it is relevant to discuss how funds are invested in real estate, the level of funding, and the leading role of local government in the process. Various studies have discussed the importance of local government in land leasing; however, most do not clearly distinguish and connect the “land fiscal revenue” and “land finance” of local government, and are limited to descriptive analysis. This paper will clarify the “land fiscal revenue” and “land finance” process of local government by institutional analysis and then empirically evidence it.

In addition to the state-owned land system, other unique characteristics contribute to the excessive

¹ Data source: China Statistic Yearbooks of 2004 and 2013.

² In this study, real estate means land and buildings on the land. Thus, investment in real estate is the funds invested in land and buildings.

³ Wenzhou house speculation groups consist of hundreds of wealthy individuals from Wenzhou that partake in house speculation. The first group of 157 members came into Shanghai on August 1, 2001, and bought more than 100 houses in three days. Since then, further groups targeted other cities, such as Hangzhou, Qingdao, Chongqing and Shenyang. Housing prices in these cities started soaring after these groups arrived.

investment in the real estate industry. Cary (2011) asserts that the revenue sharing system, a weak banking framework and the lack of investment opportunities also drove the overheated economy in China. Zhang and Sun (2006) pointed out that the real estate situation included risks of real estate credit exposure, government guarantees, and maturity mismatches and suggested advancing banking reform, encouraging local government rationality and strengthening the regulation of foreign capital flows in and out of the Chinese real estate industry. Hence, local government, the banking sector, the private sector (individuals and institutions), and the foreign sector all played important roles. The banking sector provides loans to the local government, real estate development enterprises and individuals, while private sector and foreign sector funds speculate on real estate. As Su and Tao (2011) highlight, the financial ties between local governments, real estate developers, and banks that share the common goal of city expansion have forged a strong growth coalition in China's local landscape. Thus, it is worth studying the various roles of different participants in the process of investment in real estate. Some studies discuss the influence of bank credit and foreign funds on housing prices in China; however, how these funds are invested in real estate is not fully known and there are few empirical studies on the effect of private funds on housing prices. Thus, this paper is a tentative study in this field.

If housing prices decrease, local governments will be trapped in a serious debt crisis, and banks, real estate enterprises, and speculations from private and foreign sectors that withdraw late from the market would face huge losses. The situation in China at present is very similar to developments in the 1980s Japan, a very risky and unsustainable position. This paper aims to address some urgent issues that have not yet been clearly studied. How, and at what level, are funds being invested in real estate? What roles do the different economic participants play in this process, particularly the leading role of local government? What are their influences on housing prices? By studying these issues, this paper tries to clarify different investments in real estate and thus understand speculative demand, and propose some policy suggestions by testing the efficiency and effectiveness of local government current development strategies. As Wang and Wang (2012) emphasized, China is an ideal laboratory to study the influence of speculative demand versus fundamentals on property prices.

Section 2 of this paper reviews previous literature. Section 3 analyzes the process of local government-led investment-driven growth in real estate prices. The roles of local governments, the banking sector, real estate development enterprises, individuals and institutions, and the foreign sector are discussed. Section 4 empirically tests the role of local government in real estate investment and thus housing prices by a panel VAR (vector autoregression) model, and analyzes the dynamic effects of different investment types on housing prices by VAR models. Section 5 outlines conclusions and policy implications.

2 Literature Review

2.1 Money and Housing Price Short-run Fluctuation

The critical effect of the macroeconomy on movements in housing prices has been evidenced by many studies, such as Case et al. (1999), Gilchrist and Leahy (2002), Adams and Füss (2010), Beltratti and Morana (2010), and Bouchouicha and Ftiti (2012). Many studies have identified the close relationship between the real estate market and monetary policies (Sims, 1992; Carlino, 1998; Bruneau and Bandt, 2003; Yang et al., 2010; Bjornland and Jacobsen, 2010; Musso et al., 2011).

Some studies investigate the influence of money supply on housing prices: Goodhart and Hofmann (2008) examine the links between money, credit, house prices and economic activities in 17 industrialized countries using a fixed-effects panel VAR using 1970–2006 quarterly data. They found a significant multidirectional link between house prices, monetary variables, and the macroeconomy, and the link

between house prices and monetary variables is stronger from 1985 to 2006 than prior to this. Beltratti and Morana (2010) investigate links between general macroeconomic conditions and the housing market for the G-7 area. They suggest that macroeconomic variables, such as interest rates and monetary aggregates, influence housing prices. Yu and Lee (2010) examine Korea and find that money supply along with other variables (corporate bond returns, and the number of building construction permits and orders received for building construction) are essential for the instability of housing prices. These studies evidence the influence of money supply on housing prices.

Based on a VAR model, Lastrapes (2002) found that a money supply shock has a significant positive influence on housing prices and housing sales in the United States, and explains that money supply promotes housing demand by reducing interest rates and user costs. Jin and Zeng (2004) develop a three-sector quantitative dynamic stochastic general equilibrium model to examine the business cycle properties concerning residential investment and house prices. They find that monetary policy and nominal interest rates play a special role in housing price determination, and money shocks lead to remarkably volatile residential investment and housing prices. These papers interpret the influence of money supply on house prices through housing investment or demand. That is, an increased money supply can increase investment in houses and thus expand housing demand, leading to house price upswings.

2.2 The Situation in China

There are many studies on the recent surge in housing price in China. Yu (2011) analyzed quarterly data from 1999 to 2010 and found it indicated relatively large bubbles in eastern metropolises, such as Beijing, Shanghai, Shenzhen, Hangzhou, and Ningbo since 2005, and that price speculation generated a greater proportion of irrational bubbles than rational intrinsic bubbles. Setser (2006) points out that China is currently experiencing a very similar investment boom to the Asian tigers of the 1990s. This is marked by a surge in bank credit to the private sector, a real estate boom, weak bank regulation and a large, bank-dominated financial sector.

Many studies find that monetary growth is the dominant reason for the upswing in housing prices. Using quarterly data from 1998:1Q–2009:4Q, Xu and Chen (2012) suggest that Chinese monetary policies are the key driving forces behind real estate price changes in China. Using a VAR model and 1998–2010 quarterly data, Zhang (2013) suggests that the recent real estate market boom is mainly driven by excessive monetary growth and dominates inflation in China. Zhang and Pang (2008) state that excess liquidity from China's foreign exchange purchases because of foreign capital inflows, contributed to the real estate market boom. Guo and Li (2011) incorporate the asymmetric cost and benefit of supplying excess liquidity into an otherwise standard time inconsistency model, and find that the central bank's incentive to stimulate economic growth with excess liquidity fuels real estate prices. Using 2004–2005 monthly data from 28 Chinese provinces, Sun and Zhang (2008) assert that the growth of private savings in the banking sector, as an index of surplus monetary liquidity, stimulates real estate bubbles, although the development level is different across the 28 provinces. Based on a VAR model, Tan and Wu (2014) compare the housing market in China with the United States. They find that housing prices in China are more sensitive to money supply shocks than those in the United States. Using Taiwanese 1975–2009 data, Chen et al. (2012) confirm that money supply is the key threshold variable to identify whether the movement in housing price is driven by real demand or investment demand. They point to the trade surpluses and inflows of capital in many regions of Asia in certain periods over the past four decades. In such overheated economies, housing prices are driven by investment demand, and thus it is better for policy makers to develop monetary policies responding to overall economic stability rather than specific

to the housing market. Based on VAR models, Liu (2013) finds that money supply has a significant positive effect on housing prices, and its effect is much greater in 2003–2011 than pre-2003. Previous studies have tested the significant positive role of money supply on the soaring housing price in China. However, how these funds were invested in real estate has not been resolved, a full picture of the different participants in the process has not been established, and the roles of the local government and private funds have rarely been empirically examined. This study aims to address these gaps.

3 Local Government-led Investment in Real Estate

3.1 Local Governments

In China, urban land is state-owned while rural land is owned by collectives. The *Land Administration Law* promulgated in 1998 says that the state may lawfully acquire land owned by collectives if acting for the “public’s interest”. Since there is no clear definition of “public interest”, the legal scope of land acquisition is expanded. All land used for either urban infrastructural development or non-public purposes (such as for industrial, commercial and residential projects) must go through the public land requisition procedure. That is, collective-owned land is first converted into state-owned land through land acquisition by the local government before being developed for infrastructural, industrial, or commercial purposes. Thus, collectives (the owners of rural land) are unable to transfer their land rights privately for urban use, and only get a low compensation for land acquisition by the local government. Generally, local government unilaterally sets a low compensation level that is much less than the lease price of the land in commercial markets (Cao et al., 2008). The phenomenon of local governments stealing farmlands from peasants or forcing them to relocate to obtain the land has been widely analyzed by scholars and reported on by journalists (Liu, 2012).

3.1.1 Land Revenue

Table 1 shows local government overall financial revenues and those directly attributable to land from 2001 to 2012. The taxes directly related to land increased from 49.8 billion RMB in 2001 to 1,012.8 billion RMB in 2012, giving general budgetary revenue ratios of 6.4% and 16.6%, respectively. Land leasing revenues also rose sharply from 179.4 billion RMB in 2001 to 3,702.8 billion RMB in 2012. Taking land taxes and leasing revenues together as a ratio of total local government revenue (general revenue + extra-budgetary revenue) shows a drastically increasing ratio from 15.3% in 2001 to 73.9% in 2010, before dropping somewhat to 60.6% by 2012. Other indirect land tax revenues are not considered here; hence the real income from land was even higher. As Fu and Tao (2011) state, in addition to taxes directly related to land, the 5% business tax paid by real estate developers also contributed significantly to local government revenues, particularly as 30% of the total tax revenue comes from business tax. This implies that local governments rely on land leasing for revenue. To optimize revenue as well as economic, and thus political, advantages local governments have different strategies for different sectors rather than a standard price.

Local governments lease land to real estate developers in four ways: negotiation (*xieyi*), tender (*zhaobiao*), auction (*paimai*), and listing (*guapai*). Negotiation means land users and the local government negotiate the leasing terms through a one-to-one discussion. Tenders are organized publicly, where land users state their leasing terms and the government selects one based on a comprehensive consideration rather than solely on price. Auctions are also public, and the highest bidder obtains the right to use the land. Different to an auction, a listing gives land users 10 or more days to quote a price in writing and the floor price is public. Cao et al. (2008) found that because of fierce regional competition, local governments lease land to the manufacturing sector mainly by negotiation, at a low price or even with a

subsidy. Commercial and residential projects are mainly leased through tender and auction, and local governments limit land supply through their underlying institutions, municipal land management and reserve centers to raise the leasing price. The *China Land and Resources Statistic Yearbook (2012)* states that the overall land price for commercial use in 105 major cities in 2011 was 5,654 RMB/sq. m., followed by residential purposes at 4,518 RMB/sq. m., while industrial use was only 652 RMB/ sq. m. The reason local governments have different strategies for different sectors is that investment by the manufacturing sector not only brings a stable stream of future local tax revenue and local economic growth, but also stimulates the land demand for commercial and residential purposes and thus further elevates the commercial and residential land price. The temporary land leasing revenue losses for the manufacturing sector could be offset by long-term tax revenues and economic development and thus increase the commercial and residential land prices. In contrast, investment in the commercial and real estate industry depends on the local development level (location-specific), thus the local government could raise commercial and residential land prices by limiting land supply for these purposes. Because of the absence of property taxes in China, residential projects cannot yield stable future revenue, and hence residential land leasing is the optimal revenue for these lands. Hence, with its monopoly on local land supply the local government is incentivized to increase industrial land supply to raise future tax revenue and stimulate local economic development and thus commercial and residential land demand. At the same time it limits the land supply for residential and commercial projects to increase current land

Table 1 Local government financial revenue from 2001 to 2011 (billion RMB)

	General Revenue (GBR)	Taxes Directly Related to Land (TDL)	Ratio of TDL/GBR (%)	Extra-Budgetary Revenue (EBR)	Land Leasing Revenue (LLR)	TDL+LLR	Ratio of (TDL+LLR) / (GBR+EBR) (%)
2001	780.3	49.8	6.4	395.3	129.6	179.4	15.3
2002	851.5	67.6	7.9	403.9	241.7	309.3	24.6
2003	985.0	89.3	9.1	418.7	542.1	631.4	45.0
2004	1189.3	120.8	10.2	434.9	641.2	762.0	46.9
2005	1488.4	159.1	10.7	514.2	588.4	747.4	37.3
2006	1830.4	196.2	10.7	594.1	767.7	1004.0	41.4
2007	2357.3	275.5	11.7	629.0	1194.8	1497.2	50.1
2008	2865.0	365.7	12.8	612.5	960.0	1391.6	40.0
2009	3260.3	481.3	14.8	606.3	1591.0	2199.2	56.9
2010	4061.3	653.0	16.1	539.5	2711.1	3399.4	73.9
2011	5254.7	629.0	12.0	-	3150.0	3841.8	73.1
2012	6107.8	1012.8	16.6	-	2690.0	3702.8	60.6

Source: Almanac of China's Finance and Banking, and China Land and Resources Statistic Yearbook; various years.

Notes: 1. From 2011, the extra-budgetary funds were abolished, and all government incomes were included in budget management.

2. Taxes directly related to land include house asset tax, urban and township land use tax, land value added tax, farmland occupation tax and contract tax (Fu and Tao, 2011).

leasing revenues (Liu et al., 2008; Tao, 2010; Wu, 2010; Lin and Yi, 2011). Table 2 shows industrial, commercial, and residential land supplies from 2003 to 2011. The greatest amount of land supplied by local governments was for industrial purposes, increasing from 99,435.0 ha. in 2003 to 191,314.5 ha. in 2011. Residential land supplies ascended from 43,323.3 ha. in 2003 to 126,452.9 ha. in 2011, followed

by commercial land. Notably, industrial land supply accounted for 50% or more of total supply, significantly greater than the residential and commercial ratios. Therefore, local governments attract industrial investment by increasing the supply of industrial land at a low price to raise future tax revenue and to stimulate local economic development; they also limit the commercial and residential land supply to raise the leasing price. Hence, they use their land supply monopoly to optimize their revenue.

Table 2 Industrial, commercial and residential land supply, 2003–2011 (unit: Ha. and %)

	Industrial Land Supply (I)	Commercial Land Supply (C)	Residential Land Supply (R)	Ratio of I/(I+C+R)	Ratio of C/(I+C+R)	Ratio of R/(I+C+R)
2003	99435.0	39082.1	43323.3	54.7	21.5	23.8
2004	89788.1	33798.4	48677.0	52.1	19.6	28.3
2005	90511.8	23267.7	43675.4	57.5	14.8	27.7
2006	154635.3	32124.5	65153.7	61.4	12.8	25.9
2007	141723.4	57751.1	80174.8	50.7	20.7	28.7
2008	92918.1	26532.0	62030.1	51.2	14.6	34.2
2009	141486.5	27570.9	81548.2	56.5	11.0	32.5
2010	153977.6	38905.2	115272.5	50.0	12.6	37.4
2011	191314.5	42629.7	126452.9	53.1	11.8	35.1

Source: Almanac of China's Finance and Banking, and China Land and Resources Statistic Yearbook; various years.

3.1.2 Land Finance

In addition to revenues from land, local states make full use of their land ownership to obtain loans through land mortgage, known as land finance. The 1995 budget law banned local governments from issuing bonds directly; hence, they set up local government financing vehicles (LGFVs) to borrow money from banks (Li and Lin, 2011). These LGFVs, such as urban development companies, land banking centers and state-owned asset management centers, have sprung up in recent years. A survey by the National Audit Office showed 6,576 LGFVs in 2010, increasing to 7,170 by the end of July 2013. Land mortgage is the most common way for local governments to get LGFV loans. The general procedure for this is that land administrative departments define the purpose and term of banking land according to government planning, and issue land use right certificates to the land banking centers. With these certificates, land banking centers can either directly apply for bank loans or indirectly collateralize loans borrowed by other LGFVs. Table 3 shows recent local government debts by type. Local governments have high debt levels, increasing from 10,717.5 billion RMB in 2010 to 17,890.9 billion RMB by June 2013. Repayment obligations accounted for approximately 61% of total debt from 2010 to June 2013. Local governments guaranteed 21.8% and 14.9% of the total debts in 2010 and June 2013, respectively. Table 4 illustrates the amounts and ratios of local government debt through LGFVs and banks, and highlights those used for infrastructure projects in recent years. Debts financed through LGFVs are high, at 46.4% in 2010 and 39.0% in June 2013. With the increase in land price, banks consider land as prime collateral, and provide many loans to local governments. As shown in Table 4, local government bank debts were 79.0% in 2010 and 56.5% in June 2013. Using these loans, local governments develop industrial zones and expand infrastructure to attract industrial investment and thus stimulate commercial and residential land demand. Table 4 shows that local government infrastructure debts were 89.4% in 2010 and 88.6% in June 2013. The total number of industrial zones and parks reached 3,837 by the end of 2003, and had further increased to 6,015 by 2006 (Su and Tao, 2011). The construction of industrial zones and parks helps attract investment and thus promotes the local industrial and commercial

development level, further elevating land related taxes and commercial land values. Hence, local governments favor infrastructure construction that could generate more revenue, economic, and political profits. These activities are accompanied by high risks. The National Audit Office reported excessive debt repayment obligations in 2012 of 14.41%, 17.36% and 26.59% at provincial, city and county levels, respectively. Local governments had promised to repay approximately 37.2% of these loans through land leasing fees by the end of 2012. There were 358 existing LGFVs borrowed new loans to repay 2010 maturity loans which accounted for 55.2% of the total maturity loans of the LGFV on average. Table 3 shows that there was a peak local government maturity loans in 2013 and 2014. With the expectation of land price appreciation, local governments still compete to expand their loans to develop industrial zones and parks. However, housing prices are already at excessive levels. Once these decrease, local governments would face a serious debt crisis from declining land values.

Table 3 Annual local government debts and ratio of maturity loans (billion RMB)

Year	Total Amount	Repayment Obligation Debts		Guarantee Obligation Debts		Subsidy Obligation Debts		Annual Ratio of Maturity Loans Among Repayment Obligation Debts (%)						
		Amount	Ratio	Amount	Ratio	Amount	Ratio	2011	2012	2013	2014	2015	2016	2017
2010	10717.5	6711.0	62.6	2337.0	21.8	1669.6	15.6	27.8	19.4	11.9	9.2	7.4	24.4-	
2012	15885.8	9628.2	60.6	2487.1	15.7	3770.5	23.7	-						
2013M6	17890.9	10885.9	60.8	2665.6	14.9	4339.4	24.3	-	-	22.9	21.9	17.06	11.58	7.79

Source: National Audit Office.

Table 4 Local government LGFV debts, those from banks and those used for infrastructure projects (billion RMB)

Year	Types of Debts	Financing Through LGFVs		Loans from Banks		Used For Infrastructure Projects	
		Amount	Ratio (%)	Amount	Ratio (%)	Amount	Ratio (%)
2010	Debts of Repayment Obligation	3137.5	46.8	5022.5	74.8	5239.0	89.1
	Debts of Guarantee Obligation	814.4	34.9	1913.4	81.9	1884.1	86.4
	Debts of Subsidy Obligation	1019.2	61.0	1532.1	91.8	1469.0	94.6
	Total	4971.1	46.4	8468.0	79.0	8592.1	89.4
2013M6	Debts of Repayment Obligation	4075.6	37.4	5525.2	50.8	8780.6	86.8
	Debts of Guarantee Obligation	883.3	33.1	1908.5	71.6	2272.0	88.6
	Debts of Subsidy Obligation	2011.6	46.4	2685.0	61.9	3787.2	93.1
	Total	6970.4	39.0	10118.7	56.6	14839.8	88.6

Source: National Audit Office.

Note: 1. According to the National Audit Office, Infrastructure Projects here include municipal constructions, land banking, transportation, affordable housing, education and science, forestry, water conservancy, and ecological construction.

3.2 Real Estate Development Enterprises

In China, real estate projects are developed by real estate development enterprises. As suppliers to the

housing market, real estate development enterprises are important industry players. Table 5 shows the 1999–2012 fund components raised by real estate development enterprises: “others” account for 46.55% of total funds, followed by “self-raised funds” (32.01%) and “domestic loans” (19.93%). “Domestic loans” are mainly the real estate development loans of financial institutions. Moreover, “others” and “self-raised funds” include significant mortgage loans from buyers (Specialized Statistical Analysis Team of China Banking Regulatory Commission, 2005). Thus, real estate development enterprise funding mainly came from banks. Real estate development investment increased in conjunction with total fund growth, at a rate surpassing 30% in 2003, 2007 and 2010. This suggests that real estate development enterprises drastically expanded their investments in real estate in recent years. Land purchase fees accounted for approximately 20% of real estate development investments, implying that land cost is a significant real estate development cost. The high cost of land is translated into high housing prices. Moreover, real estate development enterprises try to further raise the housing price level to optimize their profits, since real estate is a seller’s market in China.

Table 5 Components of real estate development enterprise funds from 1999 to 2012
(billion RMB)

Year	Total Funds							Investment for Real Estate Development			
	Amount	Growth Rate	Domestic Loans	Foreign Investment	Foreign Direct Investment	Self-raised Funds	Others	Amount	Growth Rate	Land Purchase Fees	
										Amount	Share
2001	769.6	28.3	169.2	13.6	10.6	218.4	367.1	634.4	27.3	103.9	16.4
2002	975.0	26.7	222.0	15.7	12.4	273.8	462.0	779.1	22.8	144.6	18.6
2003	1319.7	35.4	313.8	17.0	11.6	377.1	610.6	1015.4	30.3	205.5	20.2
2004	1716.9	30.1	315.8	22.8	14.3	520.8	856.3	1315.8	29.6	257.5	19.6
2005	2139.8	24.6	391.8	25.8	17.1	700.0	1022.2	1590.9	20.9	290.4	18.3
2006	2713.6	26.8	535.7	40.0	30.3	859.7	1278.1	1942.3	22.1	381.5	19.6
2007	3747.8	38.1	701.6	64.1	48.5	1177.3	1804.9	2528.9	30.2	487.3	19.3
2008	3961.9	5.7	760.6	72.8	63.5	1531.2	1597.3	3120.3	23.4	599.6	19.2
2009	5779.9	45.9	1136.5	47.9	40.3	1794.9	2800.6	3624.2	16.2	602.4	16.6
2010	7294.4	26.2	1256.4	79.1	67.3	2663.7	3295.2	4825.9	33.2	1000.0	20.7
2011	8568.9	17.5	1305.7	78.5	69.0	3500.5	3684.2	6179.7	28.1	1152.7	18.7
2012	9653.7	12.7	1477.8	40.2	35.9	3908.2	4227.4	7180.4	16.2	1210.0	16.9

Source: China Statistic Yearbook (2012).

Notes: Foreign investment includes foreign direct investment, overseas borrowing and other investment.

3.3 The Banking Sector

The Chinese financial system is bank-based and as a capital-intensive industry the real estate industry is closely connected with the banking sector. The analysis in sections 3.1 and 3.2 shows that both local governments and real estate development enterprises rely heavily on banks for their development funds. The Specialized Statistical Analysis Team of China Banking Regulatory Commission (2005) declares that approximately 60% of real estate industry funding comes from banks. With the high level of liquidity and the increase in housing prices, the banking sector expanded loans to the real estate industry from 2003. Table 6 indicates the total outstanding deposits and loans of the financial institutions, and the outstanding loans to the real estate industry from 1999 to 2012. Total outstanding deposits rose from 208,055.6 billion RMB in 2003 to 917,368.1 billion RMB in 2012, with an average annual growth rate

of 19.3% in the 2000s, suggesting massive liquidity in the banking sector. Outstanding loans to the real estate industry increased from 1,840 billion RMB in 2003 to 12,100.0 billion RMB in 2012, and accounted for an increasing percent of total outstanding loans, from 11.57% in 2003 to 19.2% to 2012. Thus, banks have provided many loans to the real estate industry at an increasing rate in recent years. Both real estate development enterprises and consumers get a large number of bank loans. Real estate development outstanding loans increased from 660 billion RMB in 2003 to 3,863 billion RMB in 2011, while house purchase outstanding loans ascended from 1,180 billion RMB in 2003 to 8,237 billion RMB in 2011. Moreover, the growth of outstanding loans to the real estate industry was approximately two to three times that of the total outstanding loans in that period, with the exception of 2008. Therefore, with excessive liquidity, banks tended to choose real estate as a primary investment target. Liang and Cao (2007) assert that there is an expansion of bank credit to real estate that causes upswings in house prices.

Table 6 Financial institutions' total outstanding deposits and loans, and the outstanding loans to the real estate industry from 1999 to 2011 (billion RMB)

	Total Outstanding Deposits		Total Outstanding loans		Outstanding loans to the Real Estate Industry				Ratio of Outstanding loans to the Real Estate Industry/ Total Lending
	Amount	Growth Rate	Amount	Growth Rate	Amount	Growth Rate	Real Estate Development Outstanding Loans	House Purchasing Outstanding loans	
1999	108778.9	13.7	9373.4	6.0	-	-	-	-	-
2000	123804.4	13.8	9937.1	13.0	-	-	-	-	-
2001	143617.2	16.0	11231.5	16.9	-	-	420.4	-	-
2002	170917.4	19.0	13129.4	21.1	-	-	-	-	-
2003	208055.6	21.7	15899.6	12.1	1840.0	-	660.0	1180.0	11.6
2004	240525.1	15.6	17819.8	9.3	2380.0	29.4	780.0	1600.0	13.4
2005	287169.5	19.4	19469.0	15.8	2821.7	18.6	914.1	1907.6	14.5
2006	335434.1	16.8	22534.7	16.1	3680.0	30.4	1410.0	2270.0	16.3
2007	389371.2	16.1	26169.1	16.0	4800.0	30.4	1800.0	3000.0	18.3
2008	466203.3	19.7	30346.8	31.7	5290.0	10.2	1930.0	3360.0	17.4
2009	597739.9	28.2	39968.5	19.9	7368.9	39.3	2527.8	4841.1	18.4
2010	718233.2	20.2	47919.6	14.4	9332.6	26.7	3132.6	6200.0	19.5
2011	809368.3	12.7	54794.7	6.0	10730.0	15.0	3488.0	7242.0	19.6
2012	917368.1	13.3	62990.7	15.0	12100.0	12.8	3863.0	8237.0	19.2

Source: Almanac of China's Finance and Banking (2001-2012), the People's Bank of China and the Report of Chinese Monetary Policy Performance in each quarter of each Year.

3.4 Foreign Sector

Since China entered the World Trade Organization in 2001, the Chinese market has gradually opened to foreign funds. With the increase in housing prices, the foreign sector expanded their investment in the real estate industry. The People's Bank of China (2004) shows that there are four ways foreign funds enter the real estate market: (1) directly establishing real estate development enterprises or sharing the equity of domestic enterprises; (2) indirect investment in the bond market or through foreign-funded real estate intermediary enterprises by volume purchase of real estate and subsequently selling land for retail purposes (3) foreign banks providing loans to real estate enterprises and consumers; (4) non-resident foreign exchange inflows purchasing houses after exchange settlement. Of these, foreign direct investment (FDI) accounts for (1), the second part of (2), and (3), while (4) is "hot money". Table 7

shows FDI, FDI to the real estate industry, and hot money net flows from 2000 to 2012. All three variables started to rapidly increase around 2003. FDI flows increased from \$53.3 billion US dollars (USD) in 2003 to \$116.0 billion USD in 2011. FDI in real estate increased as a percent against overall FDI, from 9.8% (\$5.2 billion USD) in 2003 to 21.6% (\$26.9 billion USD) in 2011. During 2004–2011, there was a large net inflow of hot money to China, reaching peaks of \$76.8 billion USD in 2004 and \$77.1 billion USD in 2010. He and Zhu (2010) found that foreign investment in real estate development has extended to inland cities and has contributed to rising housing prices in both first- and second-tier cities. Based on empirical panel data analysis, He et al. (2011) suggest that the FDI in real estate development seeks local opportunities to gain profits, and favors provinces with higher housing prices. Guo and Huang (2010a) find that hot money has driven property prices up, and has contributed to accelerating volatilities in both real estate and stock markets because of its enormous size and its preference for short-term investing.

Table 7 FDI and hot money net flows from 2000 to 2012 (billion USD)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
FDI	40.7	46.9	52.7	53.5	60.6	60.3	63.0	74.8	92.4	90.0	105.7	116.0	111.7
FDI to Real Estate Industry (FDIREI)	4.7	5.1	5.7	5.2	6.0	5.4	8.2	17.1	18.6	16.8	25.0	26.9	24.1
Ratio of FDIREI/FDI	11.4	11.0	10.7	9.8	9.8	9.0	13.1	22.9	20.1	18.7	23.6	23.2	21.6
Hot Money	-	-25.7	-16.1	40.2	76.8	46.0	-27.2	57.4	22.4	29.5	77.1	34.4	-326.7

Source: Chinese Statistic Yearbook (2012) and the China State Administration of Foreign Exchange.

Note: Hot money here is calculated by the International Balance of Payments Analysis Group of the State Administration of Foreign Exchange as follows: The change in foreign exchange reserves – (surplus of foreign trade + FDI + investment yield + funds from the abroad securities market)

3.5 Individuals and Institutions

With the expectation of housing price appreciation, individuals and institutions consider real estate as a perfect investment asset. The Bank of Japan (2007) points out that in addition to bank credit, real estate market funding can come from individuals, corporate legal persons and foreign funds through real estate funds and other means. Individuals and institutions can invest in real estate directly by purchasing it, or indirectly through the securities market and real estate trust products⁴. The Wenzhou group of house speculation has been cited as an example of direct investment by individuals by many studies (Liu, 2014). In China, the high vacancy rate⁵ of houses in recent years shows that there are many private funds (funds owned by individuals and institutions) in real estate. An investigation by the Marketing Department of Sanya City Real Estate Transaction Management House found the average vacancy rate of finished houses in Sanya city to be approximately 85% (Guo, 2012). Through a 2007 sampling survey, Meng et al. (2009) found that the average ordinary residence vacancy rate in a residential quarter opened for

⁴ Chinese real estate trusts are different from Real Estate Investment Trusts (REITs). There are no genuine real estate trusts in China (Bai, 2013). The present real estate trust products in China are mainly issued by bond, where fund flow is similar to bank credit, and the real estate trust plays a role as a second bank (Wang and Qu, 2009). Funds collected through real estate trust products mainly flow into real estate development enterprises (Wang and Qu, 2009; Qiu, 2012). Funds are collected privately from individuals or units by the real estate trust, and then flow to real estate development enterprises that mortgage their real estate development projects to the trust.

⁵ The vacancy rate here means the ratio of “houses already being sold but are still vacant /the total houses already being sold”. This differs from western countries that include houses not yet sold.

occupancy during 2004–2006 is 27.16%. The Sohu (2010) reports that the occupancy rates of many new housing estates in Beijing in the second year after the house delivery are only 30%–40%, and lower than 50% in many residential areas in Shanghai and Shenzhen although most estates were sold out prior to delivery. Data published by the Ministry of Land and Resources show that real estate development enterprises held 2,815 sections of vacant land, approximately 113 million m² in total, by May 2010. The term “Ghost Town” is widespread for housing estates with high vacancy rates in China. The financial commentator, Zhang Hong in the "Observation Today" program of CCTV-2⁶ asserted that “with the expectation of house price appreciation, every individual who has money will buy houses, and thus each individual is a potential real estate speculator.” Table 7 illustrates that areas sold and sales of commercial houses rose drastically from 2003 to 2012, with the exception of 2008 in the midst of the global financial crisis. Sales increased almost 8-fold, from 795.5 billion RMB in 2003 to 6,445.6 billion RMB in 2012. Individual and institution indirect investment also increased, with the value of issued real estate trust products sharply ascending from 81.4 billion RMB in 2003 to 3,156.4 in 2011, particularly in 2010 when there was a 335.3% growth (Table 8).

Table 8 Areas sold and sales of commercial houses, and value of real estate trust products from 2003 to 2012

Year		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Areas Sold	Amount (Sq. M.)	337.2	382.3	554.9	618.6	773.5	659.7	947.6	1047.6	1093.7	1113.0
	Growth Rate (%)	25.8	13.4	45.1	11.5	25.1	-14.7	43.6	10.6	4.4	1.8
Sales	Amount (billion RMB)	795.6	1037.6	1757.6	2082.6	2988.9	2506.8	4435.5	5272.1	5858.9	6445.6
	Growth Rate (%)	31.9	30.4	69.4	18.5	43.5	-16.1	76.9	18.9	11.1	10.0
Real Estate Trust Products	Amount (billion RMB)	8.5	14.6	15.8	18.0	123.8	29.0	45.9	200.0	315.6	228.0
	Growth Rate (%)	-	79.5	8.0	14.0	-31.2	134.2	58.4	335.3	57.8	-27.8

Source: Chinese Statistic Yearbook (2012) and the Use-trust Net (<http://www.yanglee.com>).

3.6 Local Government-led Investment in Real Estate

Section 3.5 discusses the roles different participants have in real estate investment. Local governments acquire land from collectives at an extremely low price. They then take advantage of their land supply monopoly and provide lands to the industrial sector at a low price or with a subsidy. At the same time they under-supply commercial and residential lands to stimulate leasing prices and thus optimize this revenue as well as economic and political profits (land revenue). Through their underlying LGFVs, they expand their bank debts by land mortgage for infrastructure construction—such as development of industrial zones and parks—that would attract industrial investment to stimulate local economic development, and thus increase commercial and residential land demand and further raise leasing prices. Since the Chinese real estate industry is a seller’s market, real estate development enterprises translate expensive land costs into high housing prices and further raise housing prices to increase their profits. The foreign sector, and individuals and institutions also increasingly invest in real estate with expectations of housing price appreciation. In this process, with massive liquidity, the banking sector considers real estate as prime collateral and expands loans to local governments and real estate development enterprises as well as to individuals and institutions to gain profits. Briefly, local governments foster an investment coalition where they, together with real estate development enterprises

⁶ CCTV-2 is the Finance and Economics channel of the China Central Television (CCTV), which focuses on professional financial and economic information.

and banks, develop real estate and aim to raise real estate prices. Speculation from the foreign sector, and individuals and institutions further increases housing prices. This process is summarized in Figure 1.

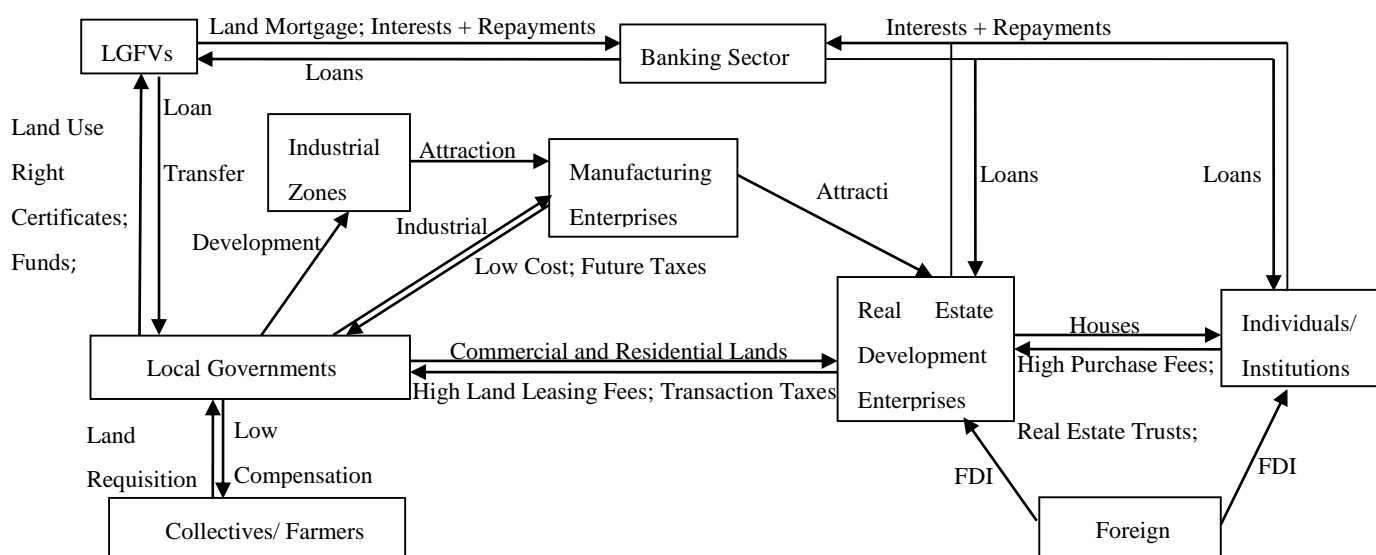


Figure 1 Local government-led investment in real estate

3.7 Estimate of Funds Invested in Real Estate

Using the process outlined in Figure 1, we calculated the amount of each participant's funds invested in real estate from 2003 to 2012 as shown in Table 9 (Appendix 1 provides details of the method used). Table 9 shows that significant funds were invested in real estate, increasing from 1,000.3 billion RMB in 2003 to 6,445.6 billion RMB in 2012—an average growth rate of 24.9%—implying that recent investments in real estate have drastically expanded. Bank loans to real estate development enterprises were large, rising from 313.83 billion RMB in 2003 to 1,477.8 billion RMB in 2012 at an average growth rate of 21.9%, suggesting that banks provide strong, steeply rising, supports to real estate development. Bank loans to consumers were also high, increasing from 420.0 billion RMB in 2004 to 995.0 billion RMB in 2012 (an average growth of 39.6%), and peaking at 1,481.1 billion RMB in 2009. There were significant individual and institution real estate investments, rising from an average value of 1,208.3 billion RMB in 2009 to 4,684.8 billion RMB in 2012. FDI in the real estate industry increased from 43.34 billion RMB in 2003 to 173.62 billion RMB in 2011, with a high average growth rate of 13.06%.

Table 10 shows the ratio of investment in real estate from each participant against the total funds from 2003 to 2011. Bank credit accounted for the greatest part of total funds invested in real estate, averaging at 49.5%. Of the bank credit, bank loans to real estate development enterprises averaged 24.9%, followed by those to consumers (21.8%). Bank loans to local governments for land development accounted for a small ratio (2.8%), suggesting that the costs of land requisition including compensations to collectives and farmers are very low. The ratio of private funds invested in real estate averaged between 40.4% and 55.6% from 2009 to 2011. FDI in the real estate industry accounted for an average of 3.4%. Investment in real estate averaged at 4.8% from the abroad securities market and 10.1% from hot money.

Table 9 Funds invested in real estate by different participants from 2001 to 2011 (billion RMB)

Year	Banking Sector	Individuals &	Foreign Sector	Total
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				Institutions			Funds Invested in Real Estate	
	Bank Loans to Real Estate Development Enterprises	Bank Loans to the Local Government	Bank Loans to Consumers	Private Funds	Foreign Direct Investment	Funds from the Abroad Securities Market		Hot Money
2001	169.2	-	-	-	42.2	-	>-212.7	644.6
2002	222.0	-	-	-	47.2	-	>-133.3	806.4
2003	313.8	-	-	-	43.3	<53.8	<332.7	1000.3
2004	315.8	-	420.0	-	49.3	<60.8	<635.7	1284.3
2005	391.8	-	307.6	-	44.4	<168.4	<376.8	1757.6
2006	535.7	-	362.4	-	65.6	<311.5	>-216.8	2186.9
2007	701.6	-	730.0	-	129.9	<96.1	<436.5	3036.9
2008	760.6	-	360.0	-	129.1	<31.7	<155.6	2608.5
2009	1136.5	340.6	1481.1	(1053.8, 1362.7)	114.7	<107.3	<201.5	4435.5
2010	1256.4	164.8	1359.0	(1564.6, 2322.9)	169.1	<236.4	<521.9	5272.1
2011	1305.7	-64.6	1042.0	(3335.2, 3630.0)	173.6	<72.6	<222.2	6086.8
2012	1477.8	95.0	995.0	(3704.0, 5665.5)	173.7	<100.8	>-2062.3	6445.6
A. G. R. (%)	21.9	-	39.6	-	18.0	-	-	24.9

Notes: 1. Bank credit and foreign funds are from an official data source, while total funds invested in real estate and private funds are estimated by the author. “(a, b)” in the “private funds” column means that the minimum and maximum of the private funds are a and b, respectively; that is, the amount of private funds is between a and b. “<c” means that the amount of the variable is lower than c.

2. The table presents flow data.

3. The unit of foreign funds is changed from “billion USD” to “billion RMB” at the relevant year exchange rate.

Source: Chinese Statistic Yearbook (2012), Almanac of China's Finance and Banking (2001-2012), the PBC, the Report of Chinese Monetary Policy Performance in each quarter of each year, the China State Administration of Foreign Exchange, and the China Securities Regulatory Commission.

Therefore, real estate investments mainly came from bank credit—accounting for 52.38%—mostly via loans to real estate development enterprises, followed by loans to consumers and a small amount from local governments. Private funds were significant from 2009 to 2011, with an average range of 40.4%–55.6%, implying increasing individual and institution speculation. FDI and funds from the abroad securities market were low, at 3.4% and less than 4.8%, respectively. However, hot money accounted for an average ratio of 10.1%, implying that there might be heavy speculative behavior from foreign funds in real estate.

Table 10 Ratios of funds invested in real estate from different participants against the total funds from 2003 to 2011 (%)

Year	Bank Sector			Individuals & Institutions	Foreign Sector			Total Funds Invested in Real Estate
	Bank Loans to Real Estate Development Enterprises	Bank Loans to the Local Government	Bank Loans to Consumers	Private Funds	Foreign Direct Investment	Funds from the Abroad Securities Market	Hot Money	
2003	31.4	-	-	-	4.3	<5.4	<33.3	100

2004	24.6	-	32.7	-	3.8	<4.7	<49.5	100
2005	22.3	-	17.5	-	2.5	<9.6	<21.4	100
2006	24.5	-	16.6	-	3.0	<14.2	>-9.9	100
2007	23.1	-	24.0	-	4.3	<3.2	<14.4	100
2008	29.2	-	13.8	-	4.9	<1.2	<6.0	100
2009	25.6	7.7	33.4	(23.8, 30.7)	2.6	<2.4	<4.5	100
2010	23.8	3.1	25.8	(29.8, 44.1)	3.2	<4.5	<9.9	100
2011	21.5	-1.1	17.1	(53.0, 58.1)	2.9	<1.2	<3.7	100
2012	22.9	1.5	15.4	(57.5, 87.9)	2.7	<1.6	>-32.0	100
Average	24.9	2.8	21.8	(41.0, 55.2)	3.4	<4.8	<10.1	100

Notes: The ratios in this table are calculated from Table 5.

4 Empirical Test

Section 3 analyzed local government-led investment in real estate, and the roles of different participants in the process and their investment amounts. To further grasp the importance of each participant, this sector will empirically examine their effects on housing prices.

4.1 Data and Methodology

4.1.1 Data

With respect to local government-related variables, because of the lack of high frequency time series (quarterly or monthly) data, this study collected annual panel data for the 31 provinces/autonomous regions in China from 2003 to 2011 to fulfill empirical analysis. The area of land leased (AL) is used as a proxy of local governments' land leasing level. Local government general fiscal revenue (GR) represents the fiscal revenue level, where extra-budgetary revenue is excluded. Since all leasing fees enter into extra-budgetary revenue, both are certainly positively connected and there is no need to include extra-budgetary revenue in the empirical analysis. The average commercialized building price (AP) in each province or autonomous region is adopted for the housing price level. These variables are expressed in logarithmic form and expressed as LAL, LGR and LAP, respectively. All the data are from the China Land and Resources Statistic Yearbook, the Finance Yearbook of China, and the China Statistic Yearbook of various years.

Panel provincial data are unavailable for funds-related variables, such as real estate development loans, housing purchasing loans, real estate trust products, and hot money; thus, this paper uses national quarterly time series data from 2003 to 2012 for empirical discussion. The AP is more consistent than the house price index⁷; hence it is adopted to represent the housing price level. Real estate development outstanding loans from financial institutions (DL) and house purchasing outstanding loans (PL) compose the investment in real estate from bank credit. Real estate trust product (RT) funds are used as a proxy for private funds invested in real estate as there is no exact data on these. RTs are not only important for the financing of real estate development enterprises, but are also popular with speculative funds from individuals and institutions. These are the only data available among private funds invested in real estate. Moreover, there are no exact data for foreign funds invested in real estate, while FDI and hot money⁸ (abbreviated as "HM" in the model) are available or countable. Martin and Morrison (2008) assert that

⁷ The method of calculating the housing price index was reformed twice—2005 and 2011—thus there are no consistent successive housing price index data from 2003 to 2012 in China (Liu, 2013).

⁸ Hot money is a term that is most commonly used in financial markets to refer to the flow of funds (or capital) from one country to another to earn a short-term profit on interest rate differences and/or anticipated exchange rate shifts. These speculative capital flows are called hot money because they can move very quickly in and out of markets, potentially leading to market instability (Martin & Morrison, 2008).

because hot money flows quickly and is poorly monitored, there is no well-defined method for estimating the amount flowing into a country in a set period. Existing literature mainly uses two methods to approximate the amount of hot money: the direct method, the sum of specific variables that constitute hot money; and the indirect method that captures hot money as a residual of other variables (see Table 11). Because of data limitation⁹ in China, we cannot follow the direct method of Loungani and Mauro (2001), Prasad and Wei (2007), and Cheung and Qian (2010). The definitions of “excessive surplus of foreign trade” and “excessive current transfer” developed by Liu (2008) are also too comprehensive to identify. While the indirect method, “hot money = the change in foreign exchange reserves – foreign trade surplus (or deficit) – net flow of foreign direct investment (FDI)”, is more feasible as data are available¹⁰. However, extant literature on China uses data from different departments to approximate hot

Table 11 Different ways for approximating hot money in existing literature

Studies	Direct Way	Studies	Indirect Way
Loungani and Mauro (2001)	Net errors and Omissions (1) + Net flows of non-FDI, non-portfolio investment assets and liabilities held by entities other than the monetary authorities, general government, and banks (2) + net flows of non-FDI, non-portfolio investment assets and liabilities held by banks (3)	Zhang and Fung (2006); The International Statistical Information Center of State Statistical Bureau in China (2006); Martin and Morrison (2008); Tung and Baker (2004); Guo and Huang (2010a, 2010b).	The change in foreign exchange reserves - foreign trade surplus (or deficit) - net flow of FDI
Liu (2008)	Excessive surplus of foreign trade + excessive current transfer + errors and omissions	Zhang and Shen (2008)	The change in foreign exchange reserves - (normal surplus of foreign trade + FDI)
Prasad and Wei (2007) Cheung and Qian (2010)	Errors and omissions + Portfolio flows	The International Balance of Payments Analysis Group of the State Administration of Foreign Exchange (2010, 2011, 2012)	The change in foreign exchange reserves – (surplus of foreign trade + FDI + investment yield + funds from the abroad securities market)

money. For example, data on foreign exchange reserves are from the Administration of Exchange Control, on foreign trade surplus are from the Ministry of Commerce, and on FDI are from the Customs Administration. Although for the same variable, details are distinct across departments. In fact, hot money is a cross-country fund flow, and the International Balance of Payments is the most accurate record of fund inflows and outflows. Therefore, this paper uses quarterly International Balance of Payments from the Finance Institution Database of the Chinese Academy of Social Sciences data to approximate hot money and FDI. Funds from the abroad securities market are included in the indirectly calculated hot money and thus are not independently introduced in the VAR models. All the above variables are expressed in logarithmic form, seasonally adjusted using the X11 method, and expressed as LDL, LPL, LRT, LFDI and LHM, respectively. Data are sourced from the State Statistical Bureau, the People’s Bank of China, the use-trust network, the Chinese Academy of Social Sciences Database and

⁹ The data for “Net flows of non-FDI, non-portfolio investment assets and liabilities held by entities other than the monetary authorities, general government, and banks”, “net flows of non-FDI, non-portfolio investment assets and liabilities held by banks”, and “Portfolio flows” are not available in the International Balance of Payments for China.

¹⁰ Although Zhang and Shen (2008) developed a definition for “normal surplus of foreign trade”, it remains difficult to identify the “normal” part. The International Balance of Payments Analysis Group of the State Administration of Foreign Exchange (2010, 2011, 2012) approximate annual hot money; however, “investment yield” quarterly data are not available.

the Tsinghua Financial Database.

The sample period is from 2003: 2Q–2012:4Q. The first year is chosen as 2003 because house prices started increasing sharply at that point. Liu (2013, 2014) finds that the financial reform since 2003 drastically promoted money supply, and thus greatly strengthened the influence of money on house prices. Further, data on loans to the real estate industry are only available since 2003:2Q.

4.1.2 Methodology

Sims (1980) proposed VARs to conduct a dynamic analysis of a system where changes to a particular variable are affected by changes to other variables, the lags of those variables, and the changes in its own lags. The VAR technique is broadly used in the analysis of financial factors and asset markets (Sims, 1992; Dekker et al., 2001; Lastrapes, 2002; Sims and Zha, 2006). However, the traditional unrestricted VAR has inherent problems. As Pesaran and Shin (1998, pg.1) contend, “the underlying shocks to the VAR model are orthogonalized using the Cholesky decomposition before impulse responses, or forecast error variance decompositions are computed. This approach is not, however, invariant to the ordering of the variables in the VAR”. Consequently, the structural VAR model is developed by Bernanke (1986), Blanchard and Quad (1989), Sims (1986), and Blanchard and Watson (1986). Dekker et al. (2001, pg.6) refer to “imposing a priori restrictions on the covariance matrix of the structural errors and the contemporaneous and/or long-run impulse responses to themselves”. Nevertheless, the number of restrictions positively relates to the number of variables, and it is sometimes difficult to impose a priori assumptions because of complex economic situations. The generalized approach to VAR was advanced by Koop et al. (1996) for nonlinear dynamic systems and by Pesaran and Shin (1998) for linear systems to overcome the above limitations. It is used in financial problem and real estate market studies, such as Dekker et al. (2001), and Ewing and Thompson (2008). Guided by these scholars, this paper uses the generalized VAR technique.

An m -dimensional and p -order vector autoregressive model is presented as follows.

$$y_t = \alpha_0 + \sum_{i=1}^p \Phi_i y_{t-i} + u_t, t = 1, 2, \dots, T \quad (1)$$

where $y_t = (y_{1t}, y_{2t}, \dots, y_{mt})'$ is an $m \times 1$ vector of endogenous variables, jointly determined by its own lags and the lags of other variables, α_0 is a $1 \times m$ vector for the fixed effect, Φ_i are $m \times m$ coefficient matrices, and u_t is an $m \times 1$ matrix of unobserved shocks (disturbances). The matrix form of Φ_i is presented below.

$$\Phi_i = \begin{bmatrix} \phi_{11}^{(i)} & \phi_{12}^{(i)} & \dots & \phi_{1m}^{(i)} \\ \phi_{21}^{(i)} & \phi_{22}^{(i)} & \dots & \phi_{2m}^{(i)} \\ \vdots & \vdots & \ddots & \vdots \\ \phi_{m1}^{(i)} & \phi_{m2}^{(i)} & \dots & \phi_{mm}^{(i)} \end{bmatrix}, i = 1, 2, \dots, p \quad (2)$$

A panel VAR model has the same structure as a VAR model, in the sense that all variables are assumed to be endogenous and interdependent, but a cross sectional dimension is added to the representation (Canova and Ciccarelli, 2013). A panel VAR of p -order is

$$y_{jt} = \alpha_{j0} + \sum_{i=1}^p \Phi_i y_{jt-i} + u_{jt}, j = 1, 2, \dots, N; t = 1, 2, \dots, T \quad (3)$$

where $t = 1, 2, \dots, T$ is the time index; $j = 1, \dots, N$ indicates the generic term for the sectional dimension, such as countries, sectors, markets or combinations of these; y_{jt} is an $m \times 1$ vector for section j with m variables; α_{j0} is a $1 \times m$ vector for the section-specific; Φ_i are $m \times m$ coefficient matrices as shown in (2); and u_{jt} is an $m \times 1$ vector of random disturbances.

4.2 Modeling

As section 3 shows, local governments try to optimize their fiscal revenue through disparate land supply strategies for different sectors, and through facilitating the investment in real estate and real estate prices. Therefore, to further examine the relationship between land leasing, local government revenues and housing price levels, a panel VAR model with data for LAL, LGR and LAP in 31 provinces/autonomous regions will be established.

Funds invested in real estate mainly come from the banking sector (bank credit), individuals and institutions (private funds), and the foreign sector (foreign funds). Thus, we will establish three VAR models for the three investment types to examine their respective effects on housing prices. We use quarterly time series data since 31 provinces' panel data for most funds are not available. Series (1) is investment in real estate from bank credit with LDL, LPL and LAP data sets. Series (2) is investment from private funds with LRT and LAP variables. System (3) is investment from foreign funds using LFDI, LHM and LAP.

First, the stationarity of all series are examined. Two tests, the Levin, Lin and Chu test and the PP-Fisher Chi-square test are applied to the panel data to ensure accuracy (Table 12). All the first difference series DLAL, DLGR, DLAP refuse the null assumption of common unit root (Levin, Lin and Chu test) and that of individual unit root (both tests) at the 1% level. Therefore, the first difference series DLAL, DLGR, DLAP enter into the panel VAR model. For the time series data, the augmented Dickey-Fuller (ADF) test is adopted, as shown by Table 13. All the series are I (1) at the 1% level. Thus, their first difference series, DLDL, DLPL, DLRT, DLFDI, DLHM and DLAP enter into the VAR models.

Table 12 Results of panel unit root test (2003:2Q to 2011:3Q)

Original Series						First Difference Series					
Series	(C,T,P)	Levin, Lin & Chu test		PP-Fisher Chi-square test		Series	(C,T,P)	Levin, Lin & Chu test		PP-Fisher Chi-square test	
		Statistic	Prob.	Statistic	Prob.			Statistic	Prob.	Statistic	Prob.
LAL	(C,0,1)	-6.09237	0.0000	57.8678	0.6253	DLAL	(0,0,1)	-14.2407	0.0000	320.165	0.0000
LGR	(C,0,1)	2.21464	0.9866	44.7134	0.9520	DLGR	(C,0,1)	-6.24019	0.0000	127.901	0.0000
LAP	(C,0,1)	-0.32336	0.3732	30.5477	0.9997	DLAP	(0,0,1)	-2.49354	0.0063	96.2444	0.0035

Table 13 Results of ADF test (2003:2Q to 2011:3Q)

The Original Series				First Difference Series			
Series	(C,T,P)	ADF Test Statistic	Prob.	Series	(C,T,P)	ADF Test Statistic	Prob.
LDL	(C,T,0)	-0.845247	0.9519	DLDL	(C,0,0)	-5.197536	0.0001
LPL	(C,T,1)	-1.450905	0.8283	DLPL	(C,0,0)	-8.584794	0.0000
LRT	(C,T,0)	-2.975066	0.1522	DLRT	(C,0,0)	-9.076719	0.0000
LFDI	(C,T,0)	-3.252030	0.0899	DLFDI	(C,0,0)	-8.195786	0.0000
LHM	(C,T,0)	-3.250282	0.0902	DLHM	(C,0,0)	-9.663017	0.0000
LAP	(C,T,0)	-3.057409	0.1309	DLAP	(C,0,3)	-5.550764	0.0001

A panel VAR model and three VAR models are established as follows. For local government-related analysis, the panel VAR consists of the first difference series of DLAL, DLGR, DLAP, with a 2-lag length¹¹. For fund-related models, bank credit is represented by Model (1), where the first difference series of DLDL, DLPL and DLAP are introduced. Private funds are explained by Model (2), comprised

¹¹ The principles of LR, FPE and AIC hint a 2-lag length for the panel VAR model.

of first difference series of DLRT and DLAP. Model (3) shows foreign funds and contains first difference series of DLFDI, DLHM and DLAP. Model (1) hints a 2-lag length, and Model (2) and Model (3) have a 1-lag length¹².

In the panel VAR model, $y_{it} = [DLAL_{it}, DLGR_{it}, DLAP_{it}]$, $t = 2003, \dots, 2011$; $p = 2$

In Model (1), $y_t = [DLDL_t, DLPL_t, DLAP_t]$, $t = 2003Q2, \dots, 2012Q4$; $p = 2$

In Model (2), $y_t = [DLRT_t, DLAP_t]$, $t = 2003Q2, \dots, 2012Q4$; $p = 1$

In Model (3), $y_t = [DLFDI_t, DLHM_t, DLAP_t]$, $t = 2003Q2, \dots, 2012Q4$; $p = 1$

The panel VAR model and all three VAR models described above are estimated using the Eviews 6.0 software and successfully pass the AR root test, implying that they are stable. The impulse response analysis based on the estimated VARs could be used to trace the dynamic responses of each variable to the innovations in a particular variable in the system.

4.3 Results of Impulse Response Analysis

The generalized impulse response functions results of the panel VAR model are illustrated in Figure 2.

Following a 1% positive shock to DLAL¹³, the DLGR response peaks at 2.14% in the second period, suggesting that land leasing could promote local government general fiscal revenue. This is consistent with the analysis in section 3 that local governments could increase tax revenue from the manufacturing sector and other land-related revenue through land leasing, in addition to land leasing fees in budgetary revenue. That is why local governments supply industrial land at a low price while limiting the commercial and residential land supply to raise leasing prices. After a 1% positive shock to DLAP, DLGR also responds positively and peaks at 1.77% in the second period. This implies that high housing prices could bring more fiscal revenue to local governments. Thus, local government is strongly incentivized to raise real estate price levels. With a 1% positive shock to DLAL, the DLAP response reaches a peak of -0.93% in the second period, showing that housing price levels would decrease by increasing land supply. Therefore, to raise the real estate price level and thus fiscal revenue, local governments limit the land supply to commercial and residential projects (as discussed in section 3). However, to control high housing prices, a suggested policy option would be to increase land supply.

¹² The principles of LR, FPE, AIC and HQ hint a 2-lag length for VAR models (1). The principles of LR, FPE, AIC, and HQ hint a 1-lag length for VAR model (2). The principles of LR, FPE and AIC hint a 1-lag length for VAR model (3).

¹³ A 1% positive shock to “DLAL” or a 1% positive “DLAL” shock means a 1% positive shock in “DLAL”, that is, the one positive standard deviation innovation to the increment of logarithmic “area of land leased”. This holds for a shock to “DLGR”, “DLAP”, “DLDL”, “DLPL”, “DLTR”, “DLFDI” and “DLHM”.

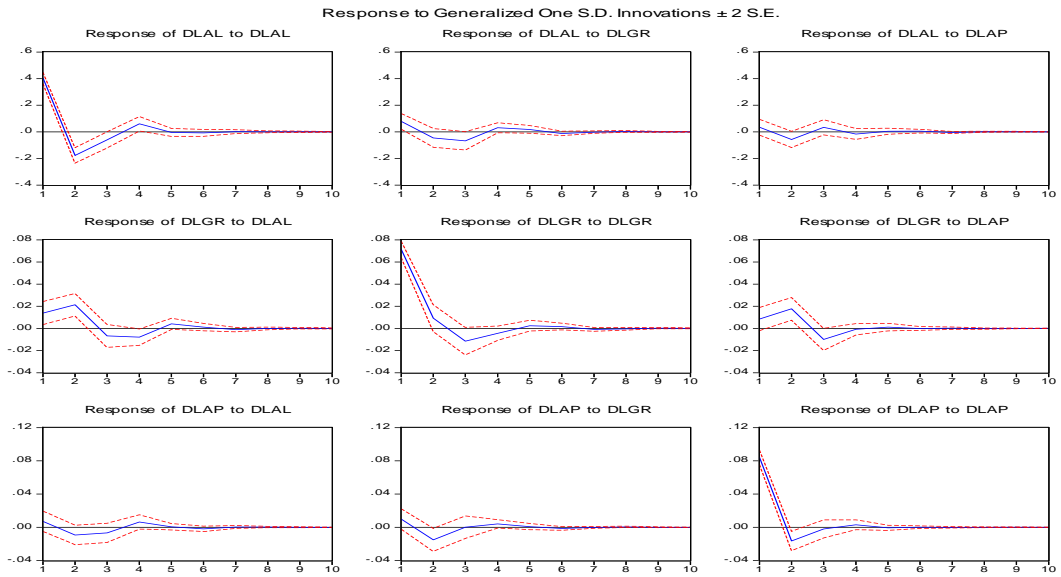


Figure 2 Results of generalized impulse response functions of the panel VAR model

The generalized impulse response functions results of model (1)—bank credit—are shown in Figure 3.

Following a 1% positive shock to DLDL, DLAP has a very limited response, at 0.23% in the first quarter and -0.14% in the third quarter. This suggests that the expansion of bank credit to real estate development enterprises would not decrease housing prices. This is because, in a seller's market local governments together with banks and real estate development enterprises forged a coalition to raise investment in real estate and real estate prices, as analyzed in section 3. When a 1% positive shock to DLPL occurs, DLAP respond at 2.11% in the first quarter, showing that expansion of house purchasing loans could increase the housing demand and thus housing prices.

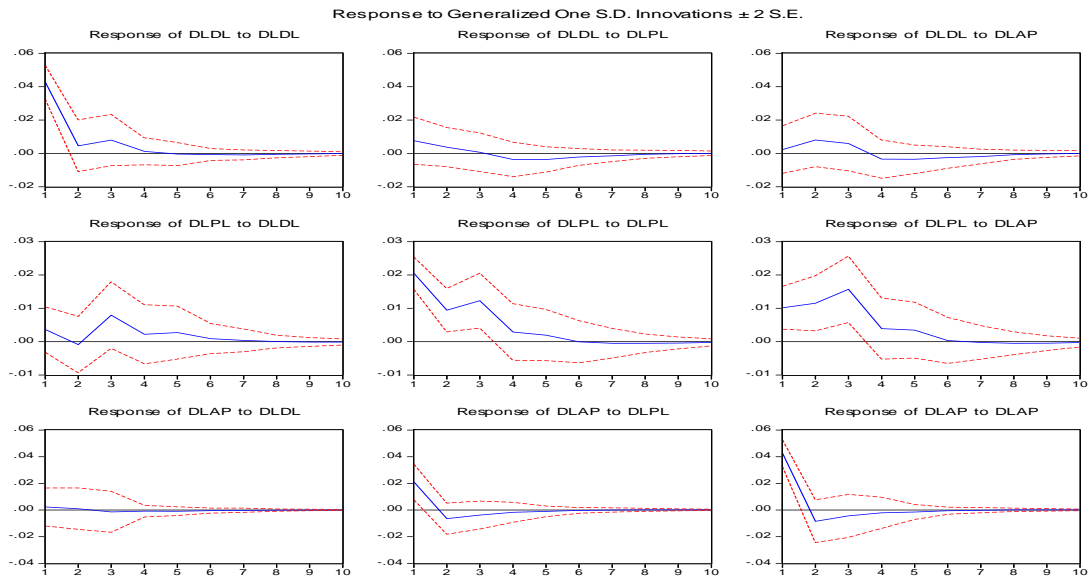


Figure 3 Results of generalized impulse response functions of model (1) (bank credit)

Both DLDL and DLPL respond positively following a 1% positive DLAP shock, peaking at 0.80% in

the second period and 1.57 % in the third period, respectively, suggesting that upswings in housing prices encourage the expansion of bank credit to the real estate industry. With an increase in housing prices and high liquidity levels, banks consider real estate as prime collateral and drastically increase loans to the real estate industry.

The generalized impulse response functions results of model (2)—private funds—are described in Figure 4. The response of DLAP to a 1% positive DLRT shock is greatest at -0.81% in the second quarter, turning to 0.42% in the third quarter. In China, the issued real estate trust products were mainly based on the mortgage of real estate development projects. In other words, after real estate development enterprises mortgage their projects to Trusts, the Trusts collect funds from individuals and institutions by issuing real estate trust products, and these funds indirectly flow to the real estate development enterprises. Therefore, real estate products could help real estate development enterprises obtain funds to increase the housing supply, potentially decreasing housing prices. However, most private funds are used to purchase houses directly by individuals and institutions; this could increase the housing demand and thus housing prices.

Interestingly, DLRT peaks at 3.0% in the first quarter following a 1% positive DLAP shock. This illustrates that house price upswings greatly elicit speculation by individuals and institutions in real estate trust products.

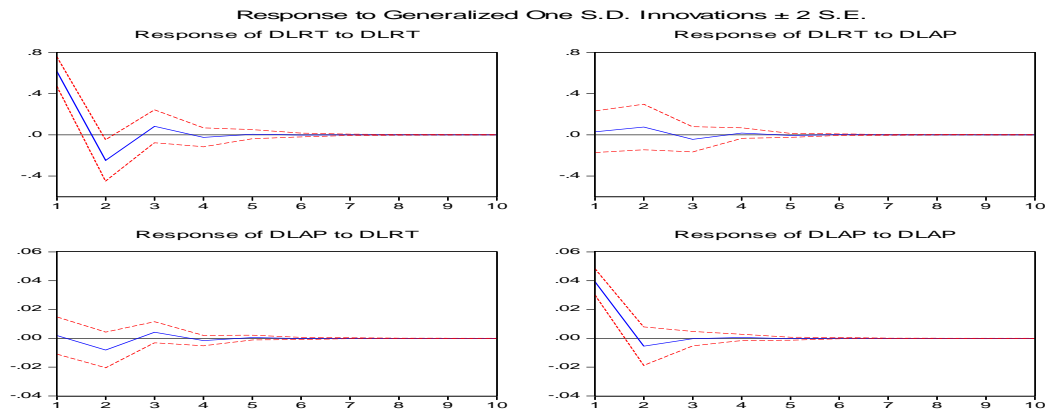


Figure 4 Results of generalized impulse response functions of model (2) (private funds)

Figure 5 shows the generalized impulse response functions results of model (3), foreign funds. When there is a 1% positive shock to DLFDI, the DLAP response peaks at 1.33% in the second quarter. Following a 1% positive DLHM shock, the strongest DLAP response of 0.73% is in the second quarter. These imply that foreign fund inflows stimulate housing price increases. As Liu (2013) asserts, foreign funds not only directly buy lands and houses, but also indirectly promote money supply and thus housing prices.

Noticeably, after a 1% positive shock to DLAP, the DLHM response is greatest at 3.62% in the second quarter. This shows that house price rises strongly stimulates the speculation in real estate from hot money.

Based on the above analysis, the panel VAR model shows that both land leasing (DLAL) and high housing price levels (DLAP) positively affect the general fiscal revenue of local governments (DLGR), at 2.14% and 1.77% , respectively. An increase in land supply (DLAL) would decrease housing prices (-0.93%). The three VAR models for the three different types of funds invested in real estate find that a house purchasing loan shock (DLPL) has the largest positive effect (2.11%) on housing prices (DLAP),

while a real estate development loan shock (DLDL) has a very limited effect. Foreign funds also have important positive effects on housing prices. DLAP has a 1.3% response to a 1% positive DLFDI shock, and a 0.73% response to a 1% positive DLHM shock. Interestingly, a housing price shock (DLAP) has very large positive influences on bank loans (0.8% and 1.57% on DLDL and DLPL, respectively), private funds (3.00% on DLRT), and hot money (3.62% on DLHM).

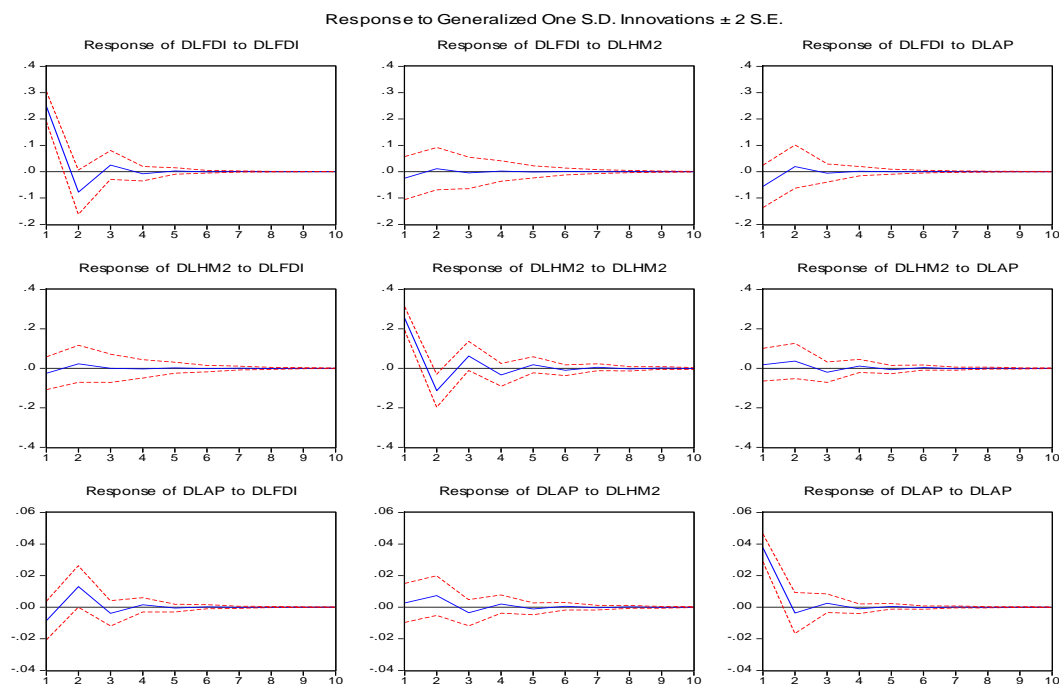


Figure 5 Results of generalized impulse response functions of model (3) (foreign funds)

These are consistent with the discussion in section 3 that local governments are incentivized to increase the supply of industrial land at a low price because of the offset from future tax revenue in general fiscal revenue and economic development, while limiting commercial and residential land supply to raise leasing prices and thus extra-budgetary revenue. Banks provide funds for the development of the real estate industry, and together with local governments and real estate development enterprises facilitate real estate price appreciation. The increase in housing prices attracts heavy speculation in real estate from individuals and institutions, and the foreign sector that further raises the housing price level. This process is a local government-led investment-driven growth; it is an inappropriate and unsustainable growth strategy and full of risks. The outcome of developments in Japan in the 1980s is a valuable lesson.

5 Conclusions

5.1 Findings

This paper analyzed local government-led investment-driven growth in real estate prices, discussed the roles of different participants in the process, particularly local government, and empirically examined their dynamic effects on housing prices. The main findings are as follows.

First, because of their monopoly on land supply, to optimize their total fiscal revenue local governments provide industrial land at a low price (or even with subsidies) for future tax revenue and local economic development, while limiting the supply of commercial and residential land to raise leasing

prices and thus extra-budgetary revenue. These are the essential contents of land revenue. Moreover, local governments obtain bank loans through their underlying LGFVs by land mortgage to develop industrial zones and parks that could attract industrial and thus commercial investment and further raise leasing prices. This process is known as land finance. Local governments tend to form coalitions for real estate investment where, together with banks and real estate development enterprises, they expand real estate development and raise real estate prices. Soaring real estate prices attract speculation from private and foreign funds, further increasing housing price levels. The panel VAR model proves that land leasing has a strong positive effect on local governments' general fiscal revenue, explaining why local governments increase the supply of industrial land at low prices. Housing price increases also positively affect local government general fiscal revenue, thus local governments are incentivized to facilitate investment in real estate and increase real estate prices. Land supply has a negative effect on the housing price level, explaining why local governments limit the commercial and residential land supplies. Consequently, local governments play a leading role in developing investment in real estate and increasing real estate prices.

Second, there has been a considerable and exponential growth in real estate investments in recent years from 1,000.3 billion RMB in 2003 to 6,445.6 billion RMB in 2012 in flow data. The banking sector provides the majority (49.5%) of funds invested in real estate. The VAR models on the different investment types showed that house purchase loans have the largest effect (2.14%) on housing prices, suggesting that the banking sector facilitates the investment in real estate and increases housing prices through its financial ties. Real estate development loans have a limited effect on housing prices, because in a seller's market real estate development enterprises translate high land prices to high housing prices, and further raise housing prices to get more profit. The increase in housing prices also positively influences house purchase loans (1.57%) and real estate development loans (0.8%), suggesting that the banking sector expands credit to the real estate industry with housing price appreciation.

Third, many private funds also invest in real estate, accounting for 40.4%–55.6% of the total investment in real estate from 2009 to 2011. Most private funds are used to purchase houses directly, which could increase housing demand and thus housing prices. The VAR model results for private funds show that an upswing in housing prices has a strong positive effect (3.00%) on real estate trust products. This implies that an increase in housing prices attracts heavy speculation from individuals and institutions.

Finally, there is heavy foreign sector investment in real estate, accounting for 3.4%–18.3% of total investment in real estate. The VAR model for foreign funds shows that both FDI and hot money have a strong positive influence on housing prices, at 1.30% and 0.73%, respectively. This implies that foreign fund speculation stimulates the growth in housing prices. Notably, the upswing in housing prices also has a significant positive effect (3.62%) on hot money, suggesting that housing price appreciation stimulates strong speculation from foreign funds.

5.2 Policy Implications

First, since local governments drive investment-driven growth in real estate based on their monopolistic land supply, we suggest gradually commercializing the land requisition system. This would allow collectives or farmers to negotiate and transact land with potential land users directly and allow them to further participate in real estate development projects. In relation to housing price control: this could foster the prosperity of the real estate industry and hence economic development, leading to a gradual decrease in real estate prices rather than a bubble burst (Tao et al., 2010). Local governments could impose multiple taxes during this process, such as land transaction and land value added taxes that would be sufficient for the necessary infrastructure construction and that could release them from heavy

debts (Cao, 2008; Tao et al., 2010). Moreover, local government political achievements should be evaluated on attaining sustainable development rather than short-term economic benefits.

Second, most investment in real estate comes from the banking sector, and house purchase loans significantly stimulate the upswing in housing prices while real estate development loans have a limited effect on housing prices. Thus, real estate related loans should be strictly and appropriately monitored. There should be restrictions on house purchasing loans for second and subsequent houses per family. Real estate development loans should be provided for ordinary houses and small and medium low-priced commodity housing rather than for high-grade houses and villas.

Finally, there has been heavy speculation from private and foreign funds in recent years. Hence, the regulatory and supervision department should act to restrain real estate speculation such as imposing a heavy tax on vacant houses and lands and on second and subsequent houses. Because hot money flows quickly, to avoid a housing price bubble burst we suggest strictly monitoring international fund flows rather than implementing an immediate liberalization reform on the capital account in China.

5.3 Contributions and Limitations

This study discussed the process of local government-led investment-driven growth in real estate prices from institutional analyses and empirical tests. We establish the leading role of local government in real estate investment, and the facilitation of banks and real estate development enterprises on real estate development. We also show that housing price appreciation attracts speculation from private foreign funds, further increasing housing prices.

The study has certain limitations. For example, because of data limitations, we could not accurately establish the real estate investment amounts from individuals and institutions, hot money and the abroad securities market.

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Appendix

1 Estimating Investments in Real Estate for Each Participant in Each Year

Bank loans to real estate development enterprises are represented by real estate development enterprise domestic loans in Table 5. Bank loans to local governments are obtained by subtracting the land development outstanding loans in the previous year from those in the current year. Bank loans to consumers are represented by subtracting the house purchasing outstanding loans of the financial institutions in the previous year from those in current year (Table 6). Table 7 shows FDI in the real estate industry. Although we do not know how much of the funds invested in real estate were from the abroad securities market and hot money, they must be smaller than the total amounts of both variables in each year. Table 7 shows hot money. Funds from the abroad securities market are obtained from the China Securities Regulatory Commission. Since private funds are owned by individuals, institutions, enterprises and units, it is impossible to estimate the amount invested in real estate. Therefore, we estimate the total funds invested in real estate and subtract the investment from other participants: the residual funds are from individuals and institutions. Since real estate is an asset as well as a general commodity, the total investment in real estate is composed of funds from customers as well as investment from suppliers. Funds from customers could be represented by sales of commercial buildings. Since the investment from real estate development enterprises (suppliers) on the buildings sold is included in sales, to avoid double counting only that part of the investment on buildings not yet sold should be added to the total investment in real estate. For land that has been developed, its purchase fees are included in the investment in its buildings. However, that part of the purchase fees on the land not yet developed should be added into the total investment in real estate. Therefore, the total funds invested in real estate are equal

to the sum of the following three: sales of commercial buildings, investment for real estate development on houses not yet sold (INS), and land purchase fees on land not yet developed (LND), as shown in Table A1. $INS = I * (1 - SS/TS)$, and $LND = AND/AP * LP$. Here, I is the completed investment from real estate development enterprises. SS is the area of commercial buildings already sold. TS is the total area of the commercial buildings completed. AND is the area of land not yet developed. AP is the total area of land purchased. LP is the total land purchase fees. All the data are from the China Statistic Yearbook. We calculate the range of the investment in real estate by individuals and institutions by subtracting banking and foreign sector funds from the total investment in real estate, as shown in Table A1.

Table A1 Proxy of investment in real estate by each participant

	Variables	Data Source/Estimation Methods
Bank Credit (BC)	Bank Loans to Real Estate Development Enterprises	= Domestic loans of real estate development enterprises in Table 5.
	Bank Loans to the Local Government	= Subtracting land development outstanding loans in the previous year from those in the current year. Data are from the <i>Quarterly Report of Chinese Monetary Policy Performance</i> of various years.
	Bank Loans to Consumers	= Subtracting house purchasing outstanding loans of the financial institutions in the previous year from those in the current year in Table 6.
Private Funds (PF)		= TF-FF-BC
Foreign Funds (FF)	Foreign Direct Investment	= Foreign direct investment to the real estate industry from the China Statistic Yearbook
	Funds from the abroad securities market	< The amount of funds from the abroad securities market from the China Securities Regulatory Commission
	Hot Money	< The amount of hot money from the China State Administration of Foreign Exchange
Total Funds Invested in Real Estate (TF)		= Sales of commercial buildings + Investment for real estate development on houses not yet sold (INS) + Land purchase fees on land not yet developed (LND), where $INS = I * (1 - SS/TS)$; and $LND = AND/AP * LP$. Here, I is the investment from real estate development enterprises. SS is the area of commercial buildings being sold. TS is the total area of commercial buildings completed. AND is the area of land not yet developed. AP is the total area of land purchased. LP is the total land purchase fees.

Notes: We first get data for BC and FF, then estimate TF, and finally calculate PF. PF data are a range rather than an exact number. Its minimum is obtained when the maximums of funds from the abroad securities market and hot money enter into the calculation. Its maximum is obtained when there are no such funds. If hot money flowing into China in a certain year is “a”, the investment in real estate from hot money in that year is estimated at lower than “a”. Investment in real estate from the abroad securities market is similarly estimated.