Advances in Asian Social Science (AASS)
Vol. 1, No. 4, 2012, ISSN 2167-6429

www.worldsciencepublisher.org

Property Price and Local Fiscal Revenue: An Empirical Investigation with Panel Data

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Abstract By investigating the panel data of "Seventy Upper Middle Cities"[1] in China from Year 1997 to 2009, this paper discovers the relationship between property price and local government fiscal revenue[2] with an empirical model, confirms the nexus through investigating the robustness of the model, and ensures the causality via the instrumental variable estimation: A one percent change in house price could result in about 10% change in local fiscal revenue. Besides, this paper proposes that it is the abandonment of welfare-oriented public housing distribution system that ties up the house price and local fiscal revenue through the discovery of interaction term of policy dummy and property price: the association between real estate market and fiscal revenue becomes significant after the abandonment of welfare-oriented public housing distribution system, and 1% change of house price could result in 18.9% change in local fiscal revenue on average.

Keywords Local Fiscal Revenue; Instrumental Variable Estimation; abandonment of welfare-oriented public housing distribution system

1. Introduction

The property market in China has grown rapidly and now become an important source of economic growth as well as government fiscal revenue. Following some declines in the earlier years, property prices started to pick up in 2001, the nationwide property price index has increased by 94% from 2000 to 2009 (China Statistical Yearbook, 2000 to 2009). Price rises have been sharp in major cities (which is composed of thirty five cities before 2006 and thereafter seventy cities) and coastal provinces.

Peng, Tam and Yiu (2008) argue that the sales of land and property development have become an important source of income for local governments, and local governments fiscal revenues are tightly associated with the growth[3]

Under the finance system reform, the budgetary fiscal revenue couldn't satisfy local governments' need and local governments have to deal with huge fiscal gap. While on the other hand, local government officials are in the GDP tournament and strive to boost the economic growth within their jurisdiction (Zhou, 2007), and the officials resort to the real estate industry; the direct tax revenue and miscellaneous relevant tax items would make up the local fiscal gap[4], which induced a phenomenon which is addressed by Chinese Scholars as "Land Finance"[5].

Empirical studies that discuss the relationship between house price and fiscal revenue are still in infancy since the financial crisis broke out only three years ago. Jonung (2008) argues that the causes and consequences of the financial crises combusted within the Nordic countries (Finland, Norway and Sweden) in the early 1990s are the crash in house price during the boom-bust episode, and worse still these three economies went into a deep recession since then. Eschenbach et al. (2004) empirically analyze the stock market and real estate market fluctuation and fiscal revenue of industrialized countries like United Kingdom and Sweden, and conclude that major fiscal deteriorations would typically occur during significant asset price downturns or financial crises, particularly when the two markets swamp in the recession. More importantly, their research suggests that fiscal revenues are impacted much more heavily than what can be explained by influence of the business cycles and discretionary fiscal policy measures.

This paper would mainly focus on the nexus of property price and local government fiscal revenue, the causality of them, and the consequence of the policy abandoned welfare-oriented public housing distribution system. The paper

[1] I try to pick out all these seventy representative cities which are in consensus for Chinese scholars and government officials as "Seventy Upper Middle Cities". They are representatives of cities in China and are listed in the appendix. However, the data of Dali are unavailable; therefore I actually obtain data of sixty nine cities. Since the popular saying is still " Seventy Upper Middle Cities", thereby I still use the notation "Seventy Upper Middle Cities" which is genuinely composed of sixty nine cities rather than seventy.

[2] In this paper, "local government" means governments at municipal level, i.e. the governments of cities.

[3] Jin, Qian and Weingast (2005) argues that the fiscal decentralization has motivated the enterprises and local government to levi tax and develop its economy, as the real estate booms, the tax revenue would be large.

[4] Here I have to mention that local governments would be even more strongly motivated to make up the huge fiscal gap and pump the economy by transferring land to real estate developers since they have discretion on land according to "The Land Administration Law of People's Republic of China". However, these fees are denoted as extra-budgetary revenue and exclusive of the state budgetary system, more importantly, the accounts are documented messily, thus I would insist using the officially recorded "fiscal revenue" for prudence.

[5] We could also obtain an official interpretation by Huang, Xiaohu, the Deputy Chair of Land Institute in China. Link:http://www.qstheory.cn/hqwg/2010/201020/201010/t20101027_5397.htm

would proceed as follows. In the next section, I explain why the policy would impact house price by introducing the history of real estate market in China as well as interpret how the property price and fiscal revenue are associated in theory. Next, I describe the panel data I collected and run the baseline model, and check the robustness of the models through substituting proxies for the original variables and investigating the subsamples. The robustness ensures the relationship between house price and local fiscal revenue. After that, I raise the endogenous explanation of house price and solve the issue of causality with instrumental variable estimation approach. Then, I come to access the influence of the policy that abolish welfare-oriented public housing distribution system both intuitively and via interaction term of policy dummy and house price econometrically. The final part concludes.

2. The Property Price and Fiscal Revenue in Theory

2.1. A Brief History of Real Estate Market in China

Under the central planning regime for a long period of time, housing in China had been treated as a social welfare product administrated and delivered by state agencies like state-owned enterprises (SOEs) and housing bureaus for its people. Within such a welfare-oriented system, the private real estate market was extinguished. Since the early 1980s, China has gradually restructured its housing system, through a series of gradual reforms on land use and housing systems. The idea of “Urban Housing Reform” was raised during the 1980s and was implemented in a large scale since 1988. The emphasis of the reform is to transform housing system from part of the welfare system to open market segments, and redefine the housing properties as commercial properties traded in the market instead of state-owned estate only subject to national policy. Private parties started to own properties as market products, and this market started to be at least influenced by the market economy, which gave birth to the real estate industry in China. Market mechanisms, with the objectives of eliminating state housing allocations, promoting the privatization of public housing, and encouraging private housing development, were introduced in stages to replace the welfare housing system (Deng and Liu, 2009). China real estate market witnessed bubbles and regulation for the bubbles in its infancy, with the “planned track”--the welfare system still exists. In those years, the real estate market developed sluggishly. The turning point arrives at year 1998. The abolition of the administrative housing allocation system in 1998 wholly activates the real estate market; the State Council announced that it would no longer allow state-owned SOEs to allocate welfare housing to their employees after December 31, 1998. Thereafter, house becomes a commodity in its true sense.

2.2. How Would House Price Impact Fiscal Revenue

Qiao (2012) discovers that fiscal expenditure could pop up the house price, and if house price boost the fiscal revenue, then we could know that house acts as a “financial stabilizer”. But how does it happen? Fiscal revenues are influenced by swings in economic activity. Public finance could smoothen economic activity via progressive taxation and public expenditure plans which are largely unaffected by the business cycle, which implies that fiscal revenues would deteriorate during downturns and improve during upswings even without discretionary policy measures. House price and valuation variations could also impact fiscal revenues (Eschenbach et al., 2004).

Capital gains that are directly related to house price, and taxation that are associated with house transaction volume and wealth effect would influence the fiscal revenue. Besides, house price would impact the macroeconomy through financial market or second-round effects on investment, consumption and employment (Peng, Tam and Yiu,2008).

Primarily, house price affects firm's tax, household tax[6] and indirect tax through wealth effect. Households and firms would feel they are wealthier when their house price is higher. The rise of collateralized house price improves reputation of both household and firms, thus enhance their confidence. These effects would stimulate consumption and investment. Kiyotaki and Moore (1997) discuss the periodical behavior of house price, they conclude that the interactive effect of credit constraint (regulation) and indirect value (land or house price) would lead to fierce fluctuation of transaction volume. Ludwig and Sløk (2002) explain consumptions of OECD countries by analyzing the relationship between real estate market and wealth, and differentiate effect brought by personal wealth from that would possibly impact the expectation of economic prospect, and conclude that both of the two types of effects are significant. In addition, the variation of house price would impact tax levied on capital gains. Generally, this kind of tax is one of direct taxes levied on households and real estate developers. There are three main components of household income that are affected:(1)Proceedings from the sales of private houses are tax-due (2)Income tax levied on dividends and profits from house price effect (3)Rental income is also taxable. Similar to household is the firm's tax. As the house ownership become globalized, revenue is not merely affected by domestic house price. Therefore, government could benefit from the house transaction directly, when house transaction is frequent, government could harvest the relevant taxes.

Moreover, house price could affect output, which in turn influences the fiscal revenue. Some economists conducted researches on the relationship between financial structure and real economy, and most of their viewpoints are based on market failure. Bernanke, Gertler and Gilchrist (1998) discover that if the distortion is serious enough, then the

[6] There's no sales tax in China, the tax is paid by manufacturers.

incompleteness of market, asymmetric information and principal-agent cost would jeopardize the economy. These problems would increase information cost and thus hinder the search and match process between lender and borrower. Kiyotaki, Michaelides and Nikolov (2011) also find that borrower would be much restricted by lenders, thus generating frictions in the transactions and impede the search and match process. In this way, the debit and credit activity would affect the confidence, and thereby impact the investment, consumption and employment, thus influencing the economic output which impacts the fiscal revenue finally. In the case of the prevailing asymmetric information, externality of financial spill-over has a negative relationship with lenders' net wealth, i.e., borrowers have to pay higher interest to lenders if they are short in wealth in the world of asymmetric information. Consequently, profits and house price fluctuations would amplify the swings of borrowing and investment, then the real economy.

Furthermore, Eschenbach et al. (2004) argue that the “first-round” tax and revenue effects discussed previously may also be magnified by standard transmission mechanisms-for instance, when house prices rise, the agents feel richer and thus consume and invest more. This will raise output, which feeds back into employment and further consumption. Symmetrically, the price downturn of real estate decreases net worth and collateral, and leads agents to crunch their consumption and investment, imposing adverse effects on fiscal revenues.

3. Data and Model

3.1. The Data Source and Processing

I collect panel data of “Seventy Upper Middle Cities” (sixty nine cities genuinely) from the China Economic Internet (CEI), starting from Year 1997. Since data of Year 2007 are left null in CEI, I kept it missing, and data of house price index are obtained from China Statistical Yearbook for the corresponding years. The fiscal revenue (*fisrev*) is in ten thousand yuan (because ten thousand is “wan” in Chinese, which is a regular unit of China), house price index (*hprice*) measures the average house price while taking the former month as base 100, GDP per capita (*GDPpc*) is also in ten thousand yuan, actual utilized foreign investment (*ActFI*) in ten thousand dollars, developed area ratio (*DevRatio*) is a percentage and a measure of urbanization.

Moreover, for the section of robustness check, I also collect the average employee's income (*Wage*) in ten thousand yuan. The proxies for foreign investment give raise to the number of foreign institute investment contracts (*FIConNum*) and contracted foreign institute investment (*ConFI*), and the latter in ten thousand dollars.

Furthermore, as the detection of the robustness across the sample requires, I document the observations' characteristics, and the concrete depiction would be provided at the relevant section.

In addition, I gather the land area of the selected cities (*Area*) measured in squared kilometers and calculated lagged investment in house (*LagHI*) which is called “fixed asset investment in house” prior to 2001 and thereafter it takes the name of “real estate investment in house” in ten thousand yuan, for instrumental variable estimation are also collected.

All the nominal variables are indexed with Consumer Price Indices. Then I take logarithm form of these macroeconomic variables in order that the cities' data would be more commensurate and size effect dies down, while with exception of house price index (*hprice*) and developed area ratio (*DevRatio*).The house price index is measured by current year average price over the previous one, therefore it is already a measurement of change, while developed area ratio (*DevRatio*) is a percentage term and is kept its original format (See Khattry and Rao, 2002).

3.2. The Summary of the Data

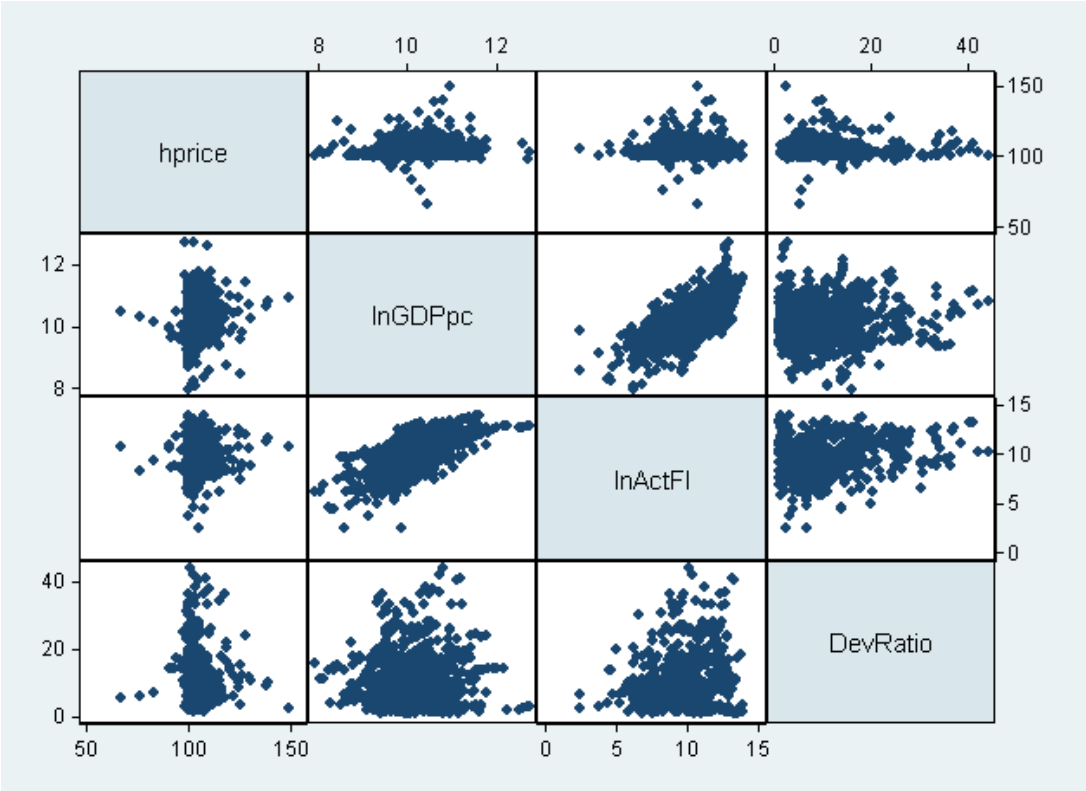


Figure 1 Correlation Matrix of Baseline Model Regressors

Table 1 Summary of the Data

Panel A	Descriptive Statistics of Variables				
Variables	No. Obs	Mean	Std. Dev.	Min	Max
lnfisrev	826	12.48	1.40	8.99	17.04
hprice	587	104.87	7.58	66.7	155.2
lnGDPpc	826	10.09	0.69	7.95	12.74
lnActFI	801	9.65	1.83	2.48	13.87
DevRatio	825	10.15	7.46	0.98	44.08
lnConFI	669	9.76	1.88	2.48	14.19
lnFIConNum	802	4.08	1.59	0	8.37
lnWage	822	9.59	0.62	6.51	17.76
lnHI	825	12.40	1.63	7.42	16.95
Panel B	Correlation Matrix Baseline Model Regressors				
	hprice	*lnGDPpc*	*lnActFI*	*DevRatio*	
hprice	1	0.1678	0.0519	.00051	
lnGDPpc	0.1678	1	0.6986	0.0248	
lnActFI	0.0519	0.6986	1	0.2076	
DevRatio	0.0051	0.0248	0.2076	1	

Table 1 lists the descriptive statistics of the variables, and it is inconspicuous that whether there is no abnormal value in this data set, thus I could proceed with the data and then detect whether the outlier does exist in the robustness check.

We should keep an eye on the correlations. *hprice* is positively related to *lnGDPpc*[7], *lnActFI* and *DevRatio*; the reason might lie in that higher house price enlarge the GDP (given the population fixed) and then GDP per capita rises, attract foreign investment and induce government to procure more farm land or barren land. Higher GDP per capita is associated with higher foreign investment and developed area ratio, while the latter two are positively correlated. We could obtain the correlations intuitively through Figure 1.

[7] The data have be taken logarithm would take letters "ln", like l*nGDPpc=log(GDPpc)*.

3.3. The Model Setup

GDP per capital acts as an agent for wealth, and Khattry and Rao (2002) utilize GDP per capita also as a scalar, therefore should be considered in the model. Zhang (2009) argues over the past 10 years, China has witnessed remarkable international capital inflows. International capital favors China because of its prominent economic growth which, during the recent decade, has created far greater opportunities for business and investment. In addition, the ever-increasing returns in the Chinese capital and real estate markets particularly promote large capital inflows. Therefore, foreign investment should be included in the model. Zhang (2006) argues that due to large differences in initial economic structures and revenue bases, the implicit tax rate and fiscal burdens to support the functioning of local government would vary significantly across local jurisdictions, hence the scale problem worth our regards. Khattry and Rao (2002) utilize GDP per capita to control for the scale effect.

The baseline model is constructed as follows:

$$lnfisrev_{i,t} = \alpha_1 hprice_{i,t} + \alpha_2 lnGDPpc_{i,t} + \alpha_3 lnActFI_{i,t} + \alpha_4 DevRatio_{i,t} + \mathbf{F}_i + \varepsilon_{i,t}$$

where α's are coefficients and one point change in house price index would generate $100\alpha_1$% change of fiscal revenue, one percent change in GDP per capita and foreign investment would bring about α_2% and α_3% variation in fiscal revenue respectively, and one point change in developed area ratio (or ratio of urbanization) would result in $100\alpha_4$% alteration in fiscal revenue. The $\mathbf{F}_i$ denotes a vector of the fixed effect which is invariant of time for these cities.

3.4. The Baseline Regression

I exploit fixed effect estimation for this panel, and standard errors are reported below the estimates in parentheses.

According to the estimates, the estimates of property price are robust to the stepwise added controls. Besides, the *lnGDPpc* would appreciate the explanatory power remarkably, and enjoy the significance at 1% level under each circumstance. The Column (5) would be the most appropriate specification, and intuitively foreign investment (*lnActFI*) positively affects fiscal revenue since investment would boost the employment and economy, then the fiscal revenue. The developed area affects the fiscal revenue negatively, which means that local government could get less tax through procuring the agriculture land and selling it to real estate developers.

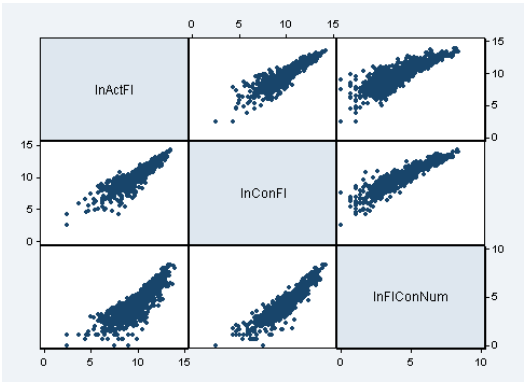
10% significance level is denoted by *, ** 5% significance level and *** 1% significance level respectively.

Table 2 Baseline Regression and Test for Proxies

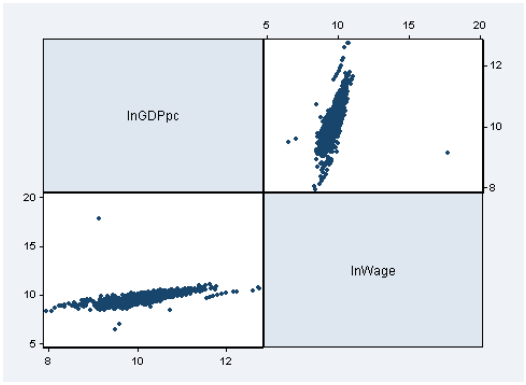
Regressand	*fisrev*						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
hprice	0.029***	0.0055**	0.0059***	0.0054**	.0089***	.0046*	.011***
	(0.0050)	(0.0025)	(0.0025)	(0.0025)	(0.0031)	(.0025)	(.0036)
lnGDPpc		1.41***	1.45***	1.51***	1.35***	1.46***	
		(0.036)	(0.046)	(0.047)	(0.071)	(.039)	
lnWage							0.61***
							(0.039)
lnConFI					0.0414*		
					(0.025)		
lnF IConNum						0.057***	
						(0.026)	
lnActF I			-0.043*	0.043*			0.29***
			(0.025)	(0.025)			(0.031)
DevRatio				-0.015***	-0.016***	-0.014***	0.045
				(0.0039)	(0.0049)	(0.0040)	(0.0058)
Adj. R^2	0.0681	0.7856	0.7905	0.7978	0.6938	0.7988	0.5569
No.Obs	518	518	500	499	367	501	496

4. Robustness of the Model

4.1. Proxies of the Control Variables



lnActFI and Its Proxies



lnGDPpc and *lnWage*

Figure 2 Original Variables and Their Proxies

People might worry that foreign investment should be ex ante rather than ex post, or merely number of foreign contracts might count because we don't know whether the foreign investor would bring profits that are tax-due and the amount. Therefore I adopt *LnFIConNum* and *lnConFI* to proxy *lnActFI*. Another noteworthy issue is that it is wage rather than GDP per capita matters in terms of income tax or so, I solve the issues by checking *lnWage* instead of *lnGDPpc*.

As we could see in Figure 2, foreign investment (*lnActFI*) keeps good linear relationship with its proxies *lnFIConNum* and *lnConFI*, consequently I could use the latter to proxy the former to check the robustness. The same goes for GDP per capita *lnGDPpc* and wage *lnWage*.

The estimates of property price are still significantly positive, and the agent for denoting residents' wealth is still significantly and positively different from 0. The proxies of foreign investment are also statistically significant, which backs up their valid appearance in the model.

4.2. Robustness across the Sample

Even if the cities I chose are " representative", they are different to each other in quite a lot of ways. People might challenge me that the jambalaya of these cities would lose some key information, thus I extract the sample by:

1) Whether the cities are in "Yangtze River Delta" economic zone (*YRD*) where the natural resources are rich.
2) Whether there are fifteen cities that own stronger jurisdictional power that is commensurate with quasi-province, we denote them as *Fushengji*.
3) Whether the city is the capital of the province (*Capital*).

Moreover, potential outliers might exist, since the transfer payment and other fiscal policy inclination would attract more people to these cities, and thus boost real estate market as well as property price, hence I drop the so-called " Special Economic Zone" (*SEZ*) which contains only two cities Shenzhen and Xiamen, and the metropolitan cities that are directly under the central government or metropolitan city, namely (*Zhixiashi*) like Beijing, Shanghai, Tianjin and Chongqing. Furthermore, as China is more globalized, trade is thus more frequent and some cities are famous for trade and export like Wenzhou, Yantai, etc; these cities would in turn attract more residents and speculations on housing market. As a result, another group characterized by this feature might be potential outliers, or the cities that are contiguous to a trade locations like coast, denoted as "Open Cities on the Coastline" (*OCC*). I test the robustness further by dropping these cities respectively.

As is demonstrated in Table 3, the presence of *hprice* for the group belongs to *YRD*, *Capital* and *Fushengji* respectively is still significant and share the same sign as the baseline regression.

The *lnGDPpc* is positively significant at 1%.

Table 3 Regression Results from Subsamples

Regressand	*fisrev*					
Group	*YRD*	*Capital*	*Fushengji*	*Non-SEZ*	*Non-Zhixiashi*	*Non-OCC*
hprice	0.013**	0.0065**	0.0094***	0.0046*	0.0049**	0.0062***
	(0.0060)	(0.0033)	(0.0037)	(0.0025)	(0.0024)	(0.0029)
lnGDPpc	1.88***	1.55***	1.14***	1.53***	1.37***	1.51***

	(0.15)	(0.057)	(0.075)	(0.048)	(0.048)	(0.053)
lnActFI	0.060	-0.078***	0.17***	-0.056***	0.042	-0.044
	(0.079)	(0.029)	(0.040)	(0.025)	(0.027)	(0.028)
DevRatio	-0.034***	0.019***	-0.0014***	-0.019***	-0.015***	-0.016***
	(0.013)	(0.0054)	(0.0046)	(0.0048)	(0.0037)	(0.0043)
Adj. R^2	0.8576	0.7941	0.8219	0.7994	0.8085	0.7902
No.Obs	53	330	178	475	451	402

5. Causality Issue: Endogenous House Price

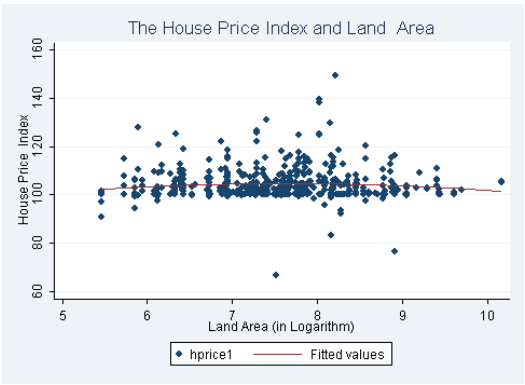
Economists argue that macroeconomic environment would considerably impact real estate market. A two-way causality problem might arise on this issue. Fiscal policy would affect house price in a great deal of ways, for example, Van Den Noord (2003) discuss how mortgage interest deduction schemes could affect house price in two opposite channels, Lindgren, Garcia and Saal (1996), Honohan and Klingebiel (2000) argue that expansive money policies like relaxation of loan constraints would tempt bank to take on more risks, which would promote house price and incur the market with more volatility.

Previous sections have taken the house price as an exogenous variable. However, as mentioned above, a currently prevalent doctrine is that house price is an endogenous variable would takes the main role in the real estate market, but for simplicity, I assume it unaffected from various factors in business cycle that would influence house price in the previous sections, which would be objected by some people, and the causality would be cast doubt upon.

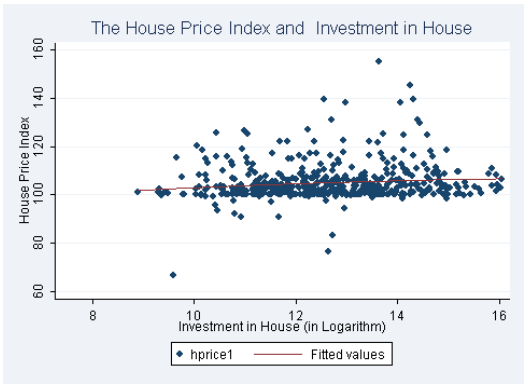
Therefore, I investigate further with Instrumental Variable by fixed effect model under the rectified assumption that "House price is endogenous", and deal with causality issue.

5.1. The Instrumental Variables: Evidence from Theory

Murray (2006a; The Bad, the Weak, and the Ugly: Avoiding the Pitfalls of Instrumental Variables Estimation) provides nine good strategies for check the validity of Instrumental Variable based on classical arguments and recent studies. In the light of his talented interpretation, I choose land area[8] (*lnArea*) and lagged investment in house (*LagHI*, in logarithm term) as the instruments.



hprice and *lnArea*



hprice and *LagHI*

Figure 3 *hprice* and Its Instruments

Land area is a good candidate and free from endogenity problem which is argued by Romer (1993); a city's land area is not determined by its current economic situation and policies, and thus can reasonably be assumed to be uncorrelated with the economic and policy determinants. Meanwhile, Li and Brown (1980) and Ihlanfeldt (2007) use land as an explanator of house price, but to the best of my knowledge, no document adopts land area as a regressor or an omitted explanatory variable of fiscal revenue, and the land area has to affect house price and then indirectly impact fiscal revenue.

On the other hand, it is easy to accept that lagged investment in house is exogenous since it should have not been affected reversely by current fiscal revenue. Moreover, the lagged investment in house have to affect current fiscal revenue through its agent house price, and then house price should affect the fiscal revenue. An instrument is not valid if it is an omitted explanator in the model (Murray, 2006a), and again, there is no literature using lagged investment in house as a regressor or an omitted explanatory variable.

It is not hard to find the relationship between property price and its instruments in Figure 3.

[8] The land area has some variation since the jurisdictional area has some change during the years, and it is considered exogenous.

5.2. The Validity of the Instruments

5.2.1. The Way Instruments Affect Fiscal Revenue

Table 4 Instrumental Variable Validity and Regression

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regressand		*lnActFI*	ε_1	ε_2	*fisrev*		*fisrev*
Instruments			*lnArea*	*LagHI*	*lnArea*	*LagHI*	Both
hprice					0.16**	0.083**	0.11***
					(0.083)	(0.042)	(0.036)
lnArea	0.086			0.15			
	(0.17)			(0.18)			
LagHI		0.050	-0.050				
		(0.039)	(0.097)				
lnGDPpc	1.10***	1.12***	1.31***	1.27***	1.04***	1.33***	1.28***
	(0.070)	(0.094)	(0.19)	(0.12)	(0.25)	(0.14)	(0.15)
lnActFI			-0.16**	-0.12*	-0.14	-0.12**	-0.14**
			(0.087)	(0.057)	(0.091)	(0.061)	(0.069)
DevRatio	0.014	-0.0042	-0.0097	-0.0037	-0.0037	-0.013	-0.011
	(0.0092)	(0.0074)	(0.012)	(0.012)	(0.014)	(0.0086)	(0.010)
Adj. R^2	0.4050	0.3555	0.1380	0.2940	0.1285	0.1805	0.2079
No.Obs	800	665	397	397	499	397	397

Chen (1996) argues that the vast land area of mainland China has created enormous regional differences economically, especially on GDP and fiscal revenue. Coughlin, Terza and Arromdee (1991) argue that Land area, the proxy for the number of sites, is a positive, statistically significant determinant of foreign direct investment location. Loree and Guisinger (1995) give a similar interpretation of land area as a determinant of foreign investment. Then it is necessary to find out whether the relationship exists by regressing *lnActFI* on other exogenous variables as well as the two instruments respectively.

$$lnActFI_{i,t} = \kappa_1 lnArea_{i,t} + \kappa_2 lnGDPpc_{i,t} + \kappa_3 DevRatio_{i,t} + \mathbf{F}_i + \epsilon_{i,t}^{lnArea}$$

$$lnActFI_{i,t} = \xi_1 LagHI_{i,t} + \xi_2 lnGDPpc_{i,t} + \xi_3 DevRatio_{i,t} + \mathbf{F}_i + \epsilon_{i,t}^{LagHI}$$

We could see Column (1) and (2) in Table 1V that the parameters of instruments I picked aren't significant; the instruments wouldn't affect fiscal revenue through foreign investment, which opposes the popular literature. Few documents take land area or lagged house price investment as independent variable in regressing GDP per capita (*lnGDPpc*), urbanization extent (developed area ratio, *DevRatio*).

People would still suspect the way by which the instruments I picked impact fiscal revenue by the gravity model, which enjoys a long history in international and regional economics. The gravity model takes into account more traditional economic reasons for international trade, including land area as an regressor for Trade; but here for the cities, the trade are hard to define and no clear account for documenting them. Moreover, the “strategic” trade might be directed centrally like what planned economy does, and some trade between the cities and foreign partners, the bilateral trade data is scarce. Furthermore, gravity model might fail to explain the regional trade in China, since the border of cities or provinces is disparate from that of countries.

5.2.2. Test Over-identifying Restrictions

Failing to reject the null hypothesis that the remaining potential instrument has zero coefficients in the second stage of two-stage least squares when included in one as explanator would support the validity of those extra variables as instruments (Murray, 2006b), as what happens in this data set; the Column (3) and (4) in Table 1V. When taking l*nArea* as instrument, the presence of *LagHI* is insignificant (p-value 0.61), while vice versa (p-value 0.43).

The Sargan's test give the χ^2 statistic equals to 1.55, corresponds to the p value of 0.2131, therefore the null hypothesis is not rejected and the instruments are not overidentified.

5.2.3. The Comparison of the Two Instruments

Using the instruments, I derive two similar results; by *lnArea* I get estimate as 0.16, significant at 5% level while

by *LagHI* I obtain the estimate of *hprice* as 0.083, signifies at 5%. People may say that the parameter estimates using different instruments differ and cast doubt on the validity of the instruments, here under the common assumption that the standard errors are independent distributed normal, I construct the t statistic to check whether the difference is significant different from 0.

H_0:The difference of the two estimates is 0

H_1: Otherwise.

$$t=\frac{|\alpha_1^{\text{lnArea}}-\alpha_1^{\text{LagHI}}|}{\sqrt{\widehat{se}_{\text{lnArea}}^2+\widehat{se}_{\text{LagHI}}^2}}\approx t(df_{\text{lnArea}}+df_{\text{LagHI}})$$

where the df_{lnArea} and df_{LagHI} are degrees of freedom within each instrumental estimation.

Then plug in the number, I derive that the t statistic between the two individual instruments equals 0.96, and corresponding p-value is 0.29; *lnArea* and both is 0.55(t statistics) and 0.17 for p-value; *LagHI* and both is 0.49 for t statistics and 0.31 for p-value. Hence we fail to reject the null hypothesis even at 10% significance level, and the difference is not significant different from 0.

5.2.4. Reduced Form Check for Two Instruments

Table 5 Reduced Form Check

Instruments	*lnArea*		*LagHI*		*lnArea* and *LagHI*	
Regressand	*hprice*	*fisrev*	*hprice*	*fisrev*	*hprice*	*fisrev*
lnArea	2.64**	0.37***			2.79**	0.28***
	(1.08)	(0.040)			(1.27)	(0.045)
LagHI			1.13**	0.10***	0.96*	0.081***
			(0.51)	(0.018)	(0.52)	(0.017)
lnGDPpc	1.68	1.16***	0.41	1.14***	-0.77	1.04***
	(1.06)	(0.038)	(1.43)	(0.048)	(1.52)	(0.049)
lnActFI	0.53	0.036**	0.69	0.030	0.63	0.027
	(0.48)	(0.017)	(0.57)	(0.018)	(0.57)	(0.018)
DevRatio	0.089	0.015***	-0.065	-0.013***	0.11	0.0083*
	(0.10)	(0.0042)	(0.089)	(0.0033)	(0.12)	(0.0047)
Adj. R^2	0.0753	0.8132	0.0524	0.7721	0.0662	0.7862
No.Obs	499	800	397	665	397	665

I validate the Instruments by checking their reduced forms. According to Murray (2006b; Avoiding Invalid Instruments and Coping with Weak Instruments), the reduced form would be:

$$hprice_{i,t}=\gamma_1 lnArea_{i,t}+\gamma_2 lnGDPpc_{i,t}+\gamma_3 lnActFI_{i,t}+\gamma_4 DevRatio_{i,t}+\mathbf{F}_i+\epsilon_{i,t}^{ha}$$

$$lnfisrev_{i,t}=\lambda_1 lnArea_{i,t}+\lambda_2 lnGDPpc_{i,t}+\lambda_3 lnActFI_{i,t}+\lambda_4 DevRatio_{i,t}+\mathbf{F}_i+\epsilon_{i,t}^{fa}$$

$$hprice_{i,t}=\theta_1 LagHI_{i,t}+\theta_2 lnGDPpc_{i,t}+\theta_3 lnActFI_{i,t}+\theta_4 DevRatio_{i,t}+\mathbf{F}_i+\epsilon_{i,t}^{hL}$$

$$lnfisrev_{i,t}=\pi_1 LagHI_{i,t}+\pi_2 lnGDPpc_{i,t}+\pi_3 lnActFI_{i,t}+\pi_4 DevRatio_{i,t}+\mathbf{F}_i+\epsilon_{i,t}^{fL}$$

The significant presence of instruments for the instrumented variable *hprice* could help to chase the cloud of invalidity away. The *lnArea* is always significant at 1% while that of *LagHI* is deprived only by its counterpart *lnArea*. Another potential flaw might be the significant presence of the instruments when taking the original dependent variable *lnfisrev* as regressand. However, it doesn't mean that the instruments I picked directly affect original dependent variable, nor would them act as omitted regressor, as previously mentioned.

5.3. The Strength of Instrumental Variables

The previous part have demonstrated that the correlation of *hprice* and its instruments, someone might still challenge that the parameter of determination R^2s of these regressions that take hprice as explained variable while take the instrument(s) as explanatory variables are small, the instruments are weak.

Let $\hat{\alpha}_1^{IV}$ be the estimate of *hprice*'s coefficient, let $\tilde{R}^2$ refer to the parameter of determination in the regression of *hprice* on its instrument(s); in other words, $\tilde{R}^2$ measures the strength of the correlation between the instrumental

variable(s) and the troublesome variable *hprice*. In this simple case, according to Hahn and Hausman (2003), the finite-sample bias of two-stage least squares for the overidentified situation in which the number of instrumental variables exceeds the number of troublesome variables is, to a second-order approximation:

$$\mathbb{E}(\hat{\alpha}_1^{IV}) - \alpha_1 \approx \frac{\ell\rho(1-\tilde{R}^2)}{n\tilde{R}^2}$$

Unpack the equation, the left-hand side expresses the bias of the two-stage least squares coefficient, which is the expected value of the two-stage least squares estimator of the coefficient for the variable of interest minus the true value of that coefficient. The numerator of the right-hand side shows that the extent of the bias rises with three factors: the number of instruments used ℓ, the extent to which the troublesome explanatory variable was correlated with the error term in the original ordinary least squares regression (ρ, in this case it captures the extent of the bias in the original ordinary least squares regression), and 1- $\tilde{R}^2$ which will be enlarged when the instrumental variables are weak. The variable ρ can be positive or negative, and determines whether the direction of two-stage least squares' bias will be upward or downward. The denominator of the right-hand-side expression shows that the bias falls as the sample size n increases.

Then we could plug the numerical values into the equation and derive the bias. Refer to the empirical numbers I derived, it is easy to discover the bias for this situation is 0.0012, the bias is minor.

People may still worry about the strength of the instruments in that although the bias is close to one standard error in magnitude and relatively small, maybe the fixed effect estimation without instruments would derive an even smaller bias. Therefore, I carry the alternative way of comparison according to Hahn and Hausman (2003):

$$\frac{Bias(\hat{\alpha}_1^{IV})}{Bias(\hat{\alpha}_1^{non-IV})} \approx \frac{\ell}{n\tilde{R}^2}$$

Therefore, we could find that the bias of two stage least squares would be -0.0043 of that without instruments when we plug in the estimated values, the bias from estimating with instruments is comparative minor to that without them.

5.4. The Instrumental Variable Regression

From the last three columns of Table 1V, we could derive the instrumental variable estimation results. The instrumental variable estimation unanimously agree the significant presence of *hprice*, and the estimate is around 0.10. Since fiscal revenue is in logarithm term while property price is in level term as the latter has already been an index (the measure of increase in house price). Then 1 point change in house price would bring about 0.10 or 10% change in fiscal revenue, the magnitude is noteworthy. Moreover, the GDP per capita still signifies at 1% level, which confirms the positive contribution of residents' wealth to fiscal revenue. The other two controls behave inconsistent during the robustness check and instrumental variable regression, however, we should allow for some minor inconsistency of the controls since they haven't affected the variable of interest.

6. The Policy Effect

6.1. Intuitive Comparison of Pre- and Post-Policy Period

In this section, I delineate the policy effects on the nexus of property price fiscal revenue. The policy liberates the housing market came into effect at the year end of 1998, as well as engendering it as the vital source of local government income. I investigate with the data from 1997.

In Table 6, regardless of the endogeneity of house price, we could attain the empirical fact that instruments are weak and house price is insignificant in 1997-1998, while the case of 1999 through 2009 is just the opposite. Using the instruments, I derive the similar estimates among the different instruments strategies.

Nonetheless, people might still suspect the relationship between the property price and fiscal revenue and ask whether it is always this way from the birth of real estate market, or may challenge that it is not attributable to the policy effect. Thereby, I detect the causality of the policy with the legacy of the previous sections and use instrumental variable approach.

Table 6 Intuitive Comparison of Pre- and Post-Policy Period

Year 1997-1998	Year 1999-2009

The explained variable be *fisrev*								
Mehod	Non-IV	lnArea	LagHI	Both	Non-IV	nArea	LagHI	Both
hprice	0.0052	-0.16	0.0025	-0.0035	0.0038	0.12**	0.095*	0.010***
	(0.0081)	(0.39)	(0.027)	(0.018)	(0.0025)	(0.053)	(0.054)	(0.036)
lnGDPpc	1.21**	3.99	1.18*	1.28**	1.52***	1.24***	1.28***	1.27***
	(0.47)	(6.62)	(0.62)	(0.53)	(0.056)	(0.19)	(0.18)	(0.16)
lnActFI	0.024	0.16	0.11	0.12	-0.075***	-0.16***	-0.13*	0.13**
	(0.060)	(0.40)	(0.082)	(0.079)	(0.027)	(0.0820)	(0.071)	(0.068)
DevRatio	0.029	0.037	0.024	0.024	-0.013***	-0.0049	-0.0094	-0.0091
	(0.020)	(0.084)	(0.020)	(0.020)	(0.0042)	(0.012)	(0.010)	(0.010)
Adj. R^2	0.3096	0.4042	0.3472	0.3254	0.7768	0.1626	0.2271	0.2115
No.Obs	68	68	66	66	431	431	363	363

6.2. Comparison of Pre- and Post-Policy Period by Interaction Term

The strategy would be the follows. Add a dummy where

$$Policy_{i,t} = \begin{cases} 0, & \text{If when welfare-oriented public housing distribution system persists.} \\ 1, & \text{Otherwise} \end{cases}$$

In Haughwout et al. (2004), they use an instrumental variable methodology to identify the plausibly exogenous determinants of changes in local rates, where the instruments are exogenous national or state-level fiscal events (policies) that are likely to influence changes in local tax rates but thought to be uncorrelated with contemporaneous changes in the city's local economy. Therefore the regression of the policy and house price interaction term on the interaction term of policy dummy and pre-assumed instruments could result in sound instruments.

Then I append a policy term pol which will denote the difference between the two periods:

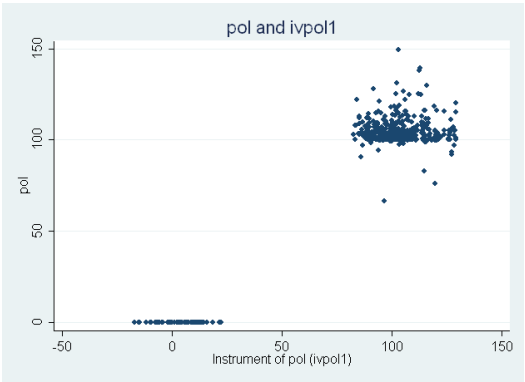
$$pol_{i,t} = Policy_{i,t} * hprice_{i,t}$$

$$\therefore ivpol1_{i,t} = \widehat{pol_{i,t}^{lnArea}} \text{ When regress } pol_{i,t} \text{ on } \ln Area * Policy_{i,t,} \text{ and other controls}$$

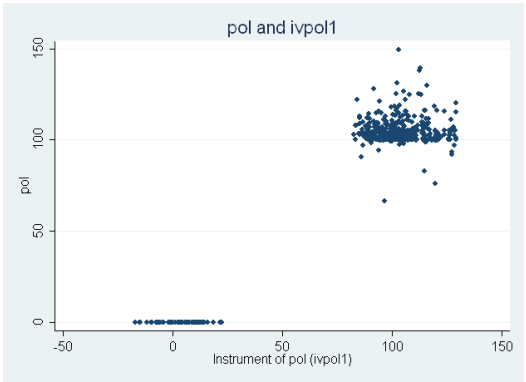
$$ivpol2_{i,t} = \widehat{pol_{i,t}^{LagHI}} \text{ When regress } pol_{i,t} \text{ on } LagHI * Policy_{i,t,} \text{ and other controls}$$

Then the *ivpol1* and *ivpol2* are two newly constructed instruments, and they would be the term indicating the policy effect, before 1999 the variable is 0 while after that it becomes the house price; in this way I could detect the policy effect.

The Figure 1V illustrates the relationship of policy term *pol* and its instruments.



pol and *ivpol1*



pol and *ivpol1*

Figure 4 *pol* and Its Instruments

The rectified model would appear as:

$$lnfisrev_{i,t} = \delta_1 pol_{i,t} + \delta_2 lnGDPpc_{i,t} + \delta_3 lnActFI_{i,t} + \delta_4 DevRatio_{i,t} + \mathbf{F}_i + \varepsilon_{i,t}$$

where δ's are coefficients. and change in policy dummy from zero to one would generate $100\delta_1 \cdot \widehat{hprice}$% change of fiscal revenue, one percent change in GDP per capita and foreign investment would bring about δ_2% and δ_3% variation in fiscal revenue respectively, and one point change in developed area ratio (or ratio of urbanization) would result in $100\delta_4$% alteration in fiscal revenue. The $\mathbf{F}_i$ denotes a vector of the fixed effect which is invariant of time for these cities.

As I did in the previous sections, the channel through which policy instruments affects fiscal revenue is restricted to policy-house price interaction term since the popular argument that policy would boost foreign investment weakens; the regression results of Column (1) and (2) in Table 7 suggest the insignificant appearance of the policy instrument term in explaining the foreign investment. Then over-identification restrictions figure out that the both instruments own the expected sign and they are insignificant when taken their counterpart as instruments and themselves being the regressor; in the first case the p-value of *ivpol2* is 0.995 while in the second case that of *ivpol1* is 0.995. Compare the Column (5) through (7), the estimates on *pol* of the two instruments, collectively or respectively, the estimate on *pol* is similar. The t-statistics for difference between *ivpol1* and *ivpol2* is 0.63, corresponding p-value is 0.26; *ivpol1* and both 0.63 for t-statistics and p-value 0.26, while those of *ivpol2* and both is 0.00057 and 0.50. As a result, I fail to reject the null hypotheses that the estimates from the two instruments are same. One step further, investigating the reduced form, I derive that both the instruments, no matter respectively or collectively participate in the regressions, are significant.

As I mentioned in the previous section, plugging in the variable, we could get:

$$\mathbb{E}(\hat{\alpha}_1^{IV}) - \alpha_1 \approx -1.15\times10^{-5}, \frac{Bias(\hat{\alpha}_1^{IV})}{Bias(\hat{\alpha}_1^{non-IV})} \approx 0.0053$$

Hence, the absolute bias is too little to be considered. Comparative bias of two stage least squares in fixed effect estimation is 0.0053 of that with respect to ordinary fixed effect estimation, also a nuance from 0 which could be neglected; i.e., compared to the ordinary fixed effect, the two stage least squares estimation is almost unbiased.

Table 7 Comparison Pre- and Post-Policy Period by Dummy Interaction

Instrumental Variable Validity and Regression							
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
y	*lnActFI*		*fisrev*		*fisrev*		*fisrev*
IV			*ivpol1*	*ivpol2*	*ivpol1*	*ivpol2*	Both
pol			0.0018	0.0018	0.0023***	0.0018***	0.0018**
			(0.0037)	(0.0063)	(0.00049)	(0.00063)	(0.00062)
ivpol1	-0.00083			-0.000044			
	(0.00080)			(0.0063)			
		-0.0017	0.000028				
		(0.0010)	(0.0040)				
lnGDPpc	1.22***	1.26***	1.46***	1.46***	1.41***	1.46***	1.46***
	(0.065)	(0.078)	(0.074)	(0.064)	(0.052)	(0.060)	(0.060)
lnActFI			-0.062**	-0.062**	-0.030	-0.062**	-0.062**
			(0.030)	(0.029)	(0.025)	(0.028)	(0.028)
DevRatio	0.00051	-0.0053	-0.016***	-0.016***	-0.013***	-0.016	-0.016
	(0.066)	(0.0074)	(0.0045)	(0.0045)	(0.0039)	(0.0044)	(0.0044)
adj. R^2	0.4029	0.3566	0.7678	0.7677	0.8033	0.7678	0.7678
No.Obs	800	665	397	397	499	397	397

The instrumental variable estimation results could be found in Table 7I Column (5) through (7), estimation results agree the significant presence of *pol* in full accord, and the estimate is around .0018. Since *pol* is an interaction of policy dummy and house price, the average value for the property price index averaged at 104.87. Given fiscal revenue in logarithm term, then 1 point change in property price would produce at least .189 or 18.9% change in fiscal revenue, the magnitude is conspicuous.

Table 8 Reduced Form Check and IV Regression

IV	*ivpol1*		*invpol2*		*ivpol1* 和 *ivpol2*	
Y	*pol*	*fisrev*	*pol*	*fisrev*	*pol*	*fisrev*
ivpol1	1.01***	0.0026***			0.64***	0.00093
	(0.012)	(0.00037)			(0.054)	(0.0018)
ivpol2			1.05***	0.0023***	0.41***	0.0032
			(0.018)	(0.00048)	(0.056)	(0.0018)
lnGDPpc	-2.40*	1.21***	-10.10***	1.20***	-6.56***	1.21***
	(1.29)	(0.037)	(1.68)	(0.043)	(1.43)	(.044)

lnActFI	0.59	0.052***	2.43***	0.042**	1.53**	0.043**
	(0.60)	(0.017)	(0.76)	(0.019)	(0.64)	(0.019)
DevRatio	0.055	-0.0099***	0.24	-0.010***	0.17*	-0.010***
	(0.097)	(0.0030)	(.12)	(0.0034)	(.099)	(.0034)
adj. R^2	0.9650	0.8096	0.9307	0.7726	0.9566	0.7739
No.Obs	499	800	397	665	397	665

7. Conclusion and Policy Considerations

In this paper I discover the relationship of property price and local fiscal revenue by regressing an empirical model and validate it with robustness investigation of the model. Moreover, I use instrumental variable estimation to solve the endogeneity of house price and confirm the property price-local fiscal revenue causality. Furthermore, I discover that the origin of the relationship is the abandonment of welfare-oriented public housing distribution system intuitively by comparing the pre-policy and post-policy periods intuitively, and verify it through the existence of an interaction term of property price and policy dummy. However, further research on this issue is required since the fiscal revenue data would be clearer when it contains the land transferring fees from real estate developers (which resembles the sale of land).

The conclusion could also be extended to the analysis by Qian, Li and He(2012) and Ray and Ray(2012) on government expenditure.

Although the paper suffers some flaws, it is still meaningful for policy makers. Recently, local governments are engaging in central's macro control on house price: local governments respond to central by imposing purchase limit on house which might impact the house price and then fiscal revenue. Policy makers should pay attention to its detrimental effect on its fiscal revenue, or they have to resort to “transfer” more land to make up the fiscal revenue gap, meanwhile house price dips could in turn crash fiscal revenue again and government “transfer” the land as well and then fall into a vicious cycle. In addition, local governments could retain some fiscal revenue in order to hedge the risk of fiscal dry up.

Appendix

Table Cities

Beijng	Chongqing	Shanghai	Tianjin	Shenyang	Changchun	Dalian
Harbin	Nanjing	Hangzhou	Ningbo	Xiamen	Jinan	Qingdao
Wuhan	Guangzhou	Shenzhen	Chengdu	Xi’an	Bengbu	Tangshan
Qinhuangdao	Taiyuan	Huhhot	Baotou	Dandong	Jinzhou	Jilin
Mudanjiang	Wuxi	Xuzhou	Yangzhou	Jinhhua	Wenzhou	Hefei
Shijiazhuang	Anqing	Fuzhou	Quanzhou	Nanchang	Jiujiang	Ganzhou
Pingdingshan	Zhengzhou	Jining	Luoyang	Yantai	Xiangfan	Yichang
Changsha	Yueyang	Changde	Shaoguan	Zhanjiang	Huizhou	Beihai
Guilin	Nanning	Haikou	Sanya	Zunyi	Nanchong	Luzhou
Guiyang	Kunming	Dali	Lanzhou	Xining	Yinchuan	Urumqi
For Those Included						
YRD	Shanghai	Nanjing	Wuxi	Yangzhou	Hangzhou	Ningbo
Capital	Beijng	Tianjin	Shanghai	Chongqing	Changchun	Shenyang
	Zhengzhou	Harbin	Hangzhou	Jinan	Guangzhou	Wuhan
	Shijiazhuang	Chengdu	Xi’an	Taiyuan	Huhhot	Hefei
	Nanchang	Fuzhou	Nanjing	Changsha	Nanning	Haikou
	Guiyang	Kunming	Lanzhou	Xining	Yinchuan	Urumqi
Fushengji	Shenyang	Ningbo	Dalian	Harbin	Nanjing	Hangzhou
	Changchun	Xiamen	Jinan	Qingdao	Guangzhou	Wuhan
	Shenzhen	Chengdu	Xi'an			
For Those Excluded						
SEZ	Shenzhen	Xiamen				
Zhixiashi	Beijing	Shanghai	Tianjin	Chongqing		
OCC	Qinhuangdao	Tanjing	Dalian	Shanghai	Ningbo	Wenzhou
	Fuzhou	Qingdao	Yantai	Guangzhou	Zhanjiang	Beihai

Dali 's data are unavailable. They and the posted sixty-nine cities are the “Seventy Upper Middle Cities” in China.

References

[1] B. Bernanke, M., Gertler, and S. Gilchrist. The Financial Accelerator in A Quantitative Business Cycle Framework. NBER Working Paper, w6455, 1998.
[2] C. Borio and P. Lowe. Asset Prices, Financial and Monetary Stability: Exploring the Nexus.BIS Working Paper, No.114, 2002.
[3] C.-H. Chen. Regional Determinants of Foreign Direct Investment in Mainland China. Journal of Economic Studies, 23(2):18–30, 1996.
[4] C. C. Coughlin, J. V. Terza, and V. Arromdee. State Characteristics and the Location of Foreign Direct Investment within the United States. The Review of Economics and Statistics, 73(4):675–683, 1991.
[5] Y. Deng and P. Liu. Mortgage Prepayment and Default Behavior with Embedded Forward Contract Risks in Chinas Housing Market. Journal of Real Estate Finance Economics, 38(3):214–240, 2009.
[6] F. Eschenbach, L. Schuknecht, M. Thum, and D. Franco. Budgetary Risks from Real Estate and Stock Markets. Economic Policy, 19(39):313–346, July 2004.
[7] J. Hahn and J. Hausman. IV Estimation with Valid and Invalid Instruments. Social Science Research Network Working Paper/Massachusetts Institute of Technology Department of Economics Working Paper Series, No.430061, 2003.
[8] A. Haughwout, R. Inman, S. Craig, and T. Luce. Local Revenue Hills: Evidence from Four U.S. Cities . The Review of Economics and Statistics, 86(2):570–585, 2004.
[9] P. Honohan and D. Klingebiel. Controlling Fiscal Costs of Banking Crises. World Bank Policy Research Working Paper, No.2441, 2000.
[10] K. R. Ihlanfeldt. The Effect of Land Use Regulation on Housing and Land Prices. Journal of Urban Economics, 61(3):420–435, 2007.
[11] H. Jin, Y. Qian, and B. R. Weingast. Regional Decentralization and Fiscal Incentives: Federalism, Chinese Style. Journal of Public Economics, 89:1719–1742, 2005.
[12] L. Jonung. Lessons from Financial Liberalisation in Scandinavia. Comparative Economic Studies, 50(35):564–598, December 2008.
[13] B. Khattry and J. M. Rao. Fiscal Faux Pas?: An Analysis of the Revenue Implications of Trade Liberalization. World Development, 30(8):1431–1444, 2002.
[14] N. Kiyotaki, A. Michaelides, and K. Nikolov. Winners and Losers in Housing Markets. Journal of Money, Credit and Banking, 43(2-3):255–296, March-April 2011.
[15] N. Kiyotaki and J. Moore. Credit Cycles. Journal of Political Economy, 105(3):211–248, April 1997.
[16] M. M. Li and H. J. Brown. Micro-Neighborhood Externalities and Hedonic Housing Prices. Land Economics, 56(2):125–141, 1980.
[17] C. Lindgren, G. Garcia, and M. Saal. Bank Soundness and Macroeconomic Policy. IMF Staff Paper, No.46, 1996.
[18] D. W. Loree and S. E. Guisinger. Policy and Non-Policy Determinants of U.S. Equity Foreign Direct Investment. Journal of International Business Studies, 26(2):281–299, 1995.
[19] A. Ludwig and T. Sløk. The Impact of Changes in Stock Prices and House Prices on Consumption in OECD Countries. IMF Working paper, 52(2), 2002.
[20] M. P. Murray. Avoiding Invalid Instruments and Coping with Weak Instruments. The Journal of Economic Perspectives, 20(4):111–132, 2006.
[21] M. P. Murray. The Bad, the Weak, and the Ugly: Avoiding the Pitfalls of Instrumental Variables Estimation. Social Science Research Network Working Paper, No.843185, 2006.
[22] National Bureau of Statistics in China. China Statistical Yearbook. China Statistical Publishing House, Beijing, 1997-2006, 2008, 2009.
[23] W. Peng, D. C. Tam, and M. S. Yiu. Property Market and the Macroeconomy of Mainland China: A Cross Region Study. Pacific Economic Review, 13(2):240–258, 2008.
[24] M. Qian, Z. Li, Q. He，The Regional Efficiency Differences Analysis of Education Expenditure in China based on DEA Model，Advances in Applied Economics and Finance, 1(1):75-80, 2012
[25] K. Qiao, Local Fiscal Expenditure and House Price: Theory and Evidence, Advances in Applied Economics and Finance, 1(1):37-44.2012
[26] S. Ray and I. RAY, On the Relationship between Government's Developmental Expenditure and Economic Growth in India: A Cointegration Analysis, Advances in Applied Economics and Finance, 1(2):86-94, 2012
[27] D. Romer. Openness and Inflation: Theory and Evidence. Quarterly Journal of Economics, 108(4):869–903, 1993.
[28] P. Van Den Noord. Tax Incentives and House Price Volatility in the Euro Area: Theory and Evidence. OECD Economics Department Working Paper, No.356, 2003.
[29] C. Zhang. Excess Liquidity, Inflation and the Yuan Appreciation: What Can China Learn from Recent History? World Economy, 32(7):998–1018, 2009.
[30] X. Zhang. Fiscal Decentralization and Political Centralization in China: Implications for Growth and Inequality. Journal of Comparative Economics, 34(4):713–726, 2006.
[31] L. Zhou. Governing China's Local Officials: An Analysis of Promotion Tournament Model. Economic Research Journal (China), Year 2007(7):36–50, 2007.
[32] Y. Zhang, L. Wu, A Robust Hybrid Restarted Simulated Annealing Particle Swarm Optimization Technique, Advances in Computer Science and its Applications, 1(1): 5-8, 2012
[33] S. Goyal, G. K. Goyal, Computerized Model for Estimating Shelf Life of Roasted Coffee Sterilized Milk Drink, Advances in Computer Science and its Applications, 1(3): 185-188, 2012
[34] J. Li, Lightweight ontologies mapping and the Semantic Similarity based on WordNet, Advances in Computer Science and its Applications, 1(2): 111-117, 2012
[35] I. Sadeghkhani, A. Mortazavian, Analysis of Transformer Harmonic Overvolatges during Power System Restoration, Advances in Electrical Engineering Systems, 1(1): 49-53, 2012
[36] Y. Zhang, L. Wu, Artificial Bee Colony for Two Dimensional Protein Folding, Advances in Electrical Engineering Systems, 1(1): 19-23, 2012
[37] X.-J. Yang, Generalized Sampling Theorem for Fractal Signals, Advances in Digital Multimedia, 1(2): 88-92, 2012
[38] G. Yi, Local Fractional Z Transform in Fractal Space, Advances in Digital Multimedia, 1(2): 96-102, 2012
[39] Y. Zhang, L. Wu, Rigid Image Registration by PSOSQP Algorithm, Advances in Digital Multimedia, 1(1): 4-8, 2012

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