Chinese Housing Market and Bank's Credit Supply

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Abstract

This paper studies the determinants of the Chinese housing price using the panel data of 31 provincial-level regions for 2000-2015. The income growth and the bank's credit supply are primary determinants of the housing prices. A one-percentage point increase in growth of bank lending raises growth of housing price by 0.232% in commercialized buildings. With the regulated bank's credit in China, findings suggest that the credit control may have contributed to stabilizing the housing bubbles.

Keywords: Housing Price, Bank Credit, Chinese Economy

JEL classification: E5

1. Introduction

The Chinese housing market has received much concern as one of primary factors destabilizing the world economy. Figure 1 shows the annual appreciation rate of housing prices in Beijing, Shanghai, and Shenzhen.[1] During the past decade, the housing market repeated the boom and bust at least three times. In this interval the appreciation rates are almost positive, implying that the Chinese housing prices persisted to rise by repeating the boom and slowdown but has never fallen. The long-lasting bubble-like appreciation is surprising in contrast with real estate booms in Japan in late 1980s and the US in 2000s that peaked out after almost five years. There is an emerging concern if the Chinese government succeed in stabilizing the housing market.

This paper aims to study the determinants of the housing prices by taking into account the possibility that the government controls the housing market by regulating the demand and supply conditions. We consider the demand-side effects of the income growth, the bank's credit supply, and the demographic factors. The government influences the demand for housing by regulating the credit supply to individual's demand for housing. As is well known, the Chinese financial markets are highly regulated, and the private firms and individuals have difficult access to the bank's credit. We also consider the supply-side effect. In China the nation-owned land is rented through the local governments to the housing developers. The local governments have a room to control the supply of the newly developed housing assets.

To evaluate these effects, we construct panel dataset of 31 Chinese provincial-level regions for 2000-2015. This dataset includes bank credit and sales amount of land as

[1] The source: 'Sales Price Indices of Newly Constructed Residential Buildings (preceding month=100)' under 'Sales Price Indices of Residential Buildings in 70 Large and Medium-Sized Cities' Indicator.

well as standard macroeconomic fundamentals. Empirical analysis reveals that increases in bank lending and growth of Gross Regional Product (GRP) contribute to an appreciation in housing prices. This result indicates that bank's credit supply as well as income growth play key roles in explaining dynamics of Chinese housing market.

A number of papers study the Chinese housing market. The recent literature includes Shih, Lib, and Qin (2014), Wu, Deng, and Liu (2014), Bian and Gete (2015), Du and Zhang (2015), Chen and Wen (2016). None of them addresses the bank's credit maybe because the access to the regional data for the bank's credit is difficult. To our small knowledge, this is the first paper that links the credit supply to the Chinese housing price in a panel data analysis.

The reminder of this paper is organized as follows: Section 2 describes housing market data, Section 3 presents empirical analysis, and Section 4 concludes.

2. Housing Market Data

Our panel dataset consists of yearly data from 31 provincial-level regions since 2000 till 2015, including 22 provinces, 5 autonomous regions, and 4 direct-controlled municipalities.[2] Table 1 provides the data source for each variable.

Insert Table 1 Here

Average selling price and sold floor space of commercialized buildings are reported by the National Bureau of Statistics of China (NBSC) under 'Investment in Fixed Assets and Real Estate' Indicator. The commercial buildings are split into four categories, commercialized residential buildings (including villas, high-grade apartments), commercialized office buildings, houses for business and other commercialized

[2] In this empirical analysis, we did not include 2 Special Administrative Regions (Hong Kong and Macao) and Taiwan province.

buildings.

The year-end loan data is collected from the Statistical Yearbooks of each provincial-level regions or local statistics bureau websites. As this paper aims at examining the housing price within China, the optimal indicator will be the loans in Renminbi in Chinese Financial Institutions. If such indicator is unavailable, we do not discriminate Renminbi from foreign currencies or domestic financial institution from foreign-funded ones.

Regional GDP (hereinafter referred to as Gross Regional Product), Consumer Price Index and Year-end Resident Population are retrieved from the database of the NBSC under 'Nation Accounts', 'Price Index' and 'Population' Indicators, respectively.

3. Empirical Analysis

This paper investigates the effects of supply of bank's credit and that of housing assets on Chinese housing prices. As a baseline analysis, we perform standard ordinary least square (OLS) regressions with fixed effect, using the dataset described in the previous section.

The estimations include growth of housing prices as a dependent variable. This paper uses four housing price indices: growth of average selling price of commercialized buildings (*ΔASP_housing*), and the three subgroups, residential buidings (*ΔASP_resid*), office buildings (*ΔASP_office*), and business buildings (*ΔASP_business*). As the explanatory variable, the estimations include growth of bank lending (*ΔLoan*) as the variable for supply of bank credit. The estimation also includes growth of sold floor space of commercialized buildings. To correspond to dependent variables, we use four types of growth of sold floor space (*ΔSA_housing*; *ΔSA_resid*;

ΔSA_office; *ΔSA_business*). These variables are proxies for supply of the newly developed housing assets. The estimations also include GRP growth rate (*ΔGRP*), inflation rate (*Inflation*), and population growth (*Δpopulation*) to control the effects of region-specific fundamentals. Summary statistics on these variables are summarized in Table 2. Finally, to reduce endogeneity concern, all the right-hand-side variables are lagged by one-year in this baseline analysis.

Insert Table 2 Here

Table 3 summarizes the results of OLS regressions, which uses growth of average selling price of commercialized buildings (*ΔASP_housing*) as a dependent variable. Column 1 shows the results of a preliminary analysis that includes only the fundamentals. As can be seen, GRP growth rate has a positively significant coefficient, which is consistent with the literature (e.g., Case and Shiller, 2003). The other fundamentals have expected coefficients, but are insignificant. Thus, these results suggest that standard fundamentals largely perform well in explaining dynamics of housing price in China.

Insert Table 3 Here

We present main results. Column 2 shows that the coefficient of bank lending is positively significant, indicating that an increase in supply of bank's credit contributes to a subsequent appreciation in housing assets. In contrast, the coefficient of sold floor space is not statistically significant although it has negative sign as expected. These findings remain unchanged even when the estimations include different sets of control variables (column 3-5). For example, a one-percentage point increase in growth of bank lending raises growth of housing price by 0.232% (Column 3).

Table 4-6 shows the results for three subgroups of housing price indices. The

findings are qualitatively similar those on commercialized buildings. Interesting is the case for commercialized office buildings. The housing price is very sensitive to GRP growth rate and bank lending. For example, a one-percentage point increase in growth of bank lending raises growth of housing price by 0.448% (Column 3). In addition, the population growth is statistically significant. Therefore, the overall results indicate that bank lending plays a key role in explaining housing price dynamics in China, as well as GRP growth.

Insert Table 4 Here

Insert Table 5 Here

Insert Table 6 Here

4. Conclusion

This paper studies the determinants of the Chinese housing price using the panel data of 31 provincial-level regions for 2000-2015. The GRP growth and the bank's credit supply are primary determinants of the housing prices.

The final concern is on the interpretation on the findings. Greenspan (2002) that remarked at Federal Reserve Bank of Kansas City symposium, "it was very difficult to definitively identify a bubble until after the fact--that is, when its bursting confirmed its existence." Controlling asset bubbles is a challenging policy area.

As is well known, the bank's credit allocation is distorted in the China. The SOEs (state owned enterprises) have easy access to bank credit, but the private firms and individuals do not. Combined with the fact the housing price persisted to appreciate but never fell (Figure 1), our findings suggest a possibility that the credit control contributes to stabilizing the housing bubbles.

Of course, we should be modest to finalizing conclusion. For example, we did not consider the effect of the shadow banking that has grown in the last decade in China and is supposed to have an impact on the housing market. The shadow banking is by definition the credit intermediation outside the traditional banking system and hence uncontrollable by the government. The further research is necessary to convince the conclusion.

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Figure 1. Annual Appreciation Rate of Housing Prices

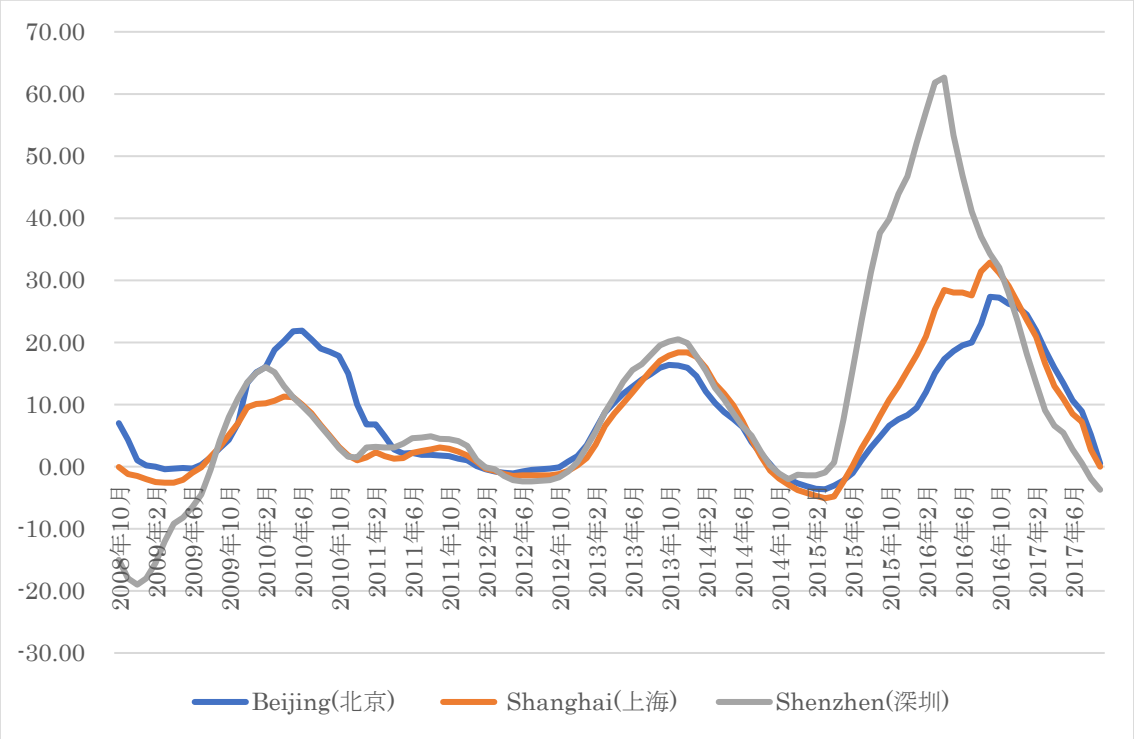

Table 1. Variables and Data Sources

Notation	Description	Source
ASP_housing	Average Selling Price of Commercialized Buildings(yuan/sq.m)	National Bureau of Statistics of China
ASP_resid	Average Selling Price of Commercialized Residential Buildings(yuan/sq.m)	National Bureau of Statistics of China
ASP_office	Average Selling Price of Commercialized Office Buildings(yuan/sq.m)	National Bureau of Statistics of China
ASP_business	Average Selling Price of Houses for Business Use(yuan/sq.m)	National Bureau of Statistics of China
SA_housing	Floor Space of Commercialized Buildings Sold (10000 sq.m)	National Bureau of Statistics of China
SA_resid	Floor Space of Residential Buildings Sold (10000 sq.m)	National Bureau of Statistics of China
SA_office	Floor Space of Office Buildings Sold (10000 sq.m)	National Bureau of Statistics of China
SA_business	Floor Space of Houses for Business Use Sold (10000 sq.m)	National Bureau of Statistics of China
Loan	The year-end loan in Financial Institutions	Statistical Yearbooks of each provincial-level regions or local statistics bureau websites
GRP	Gross Regional Product (100 million yuan)	National Bureau of Statistics of China
CPI	Consumer Price Index (preceding year=100)	National Bureau of Statistics of China
pop_resid	Resident Population (year-end) (10000 persons)	National Bureau of Statistics of China

Table 2. Summary Statistics

	Mean	Std. Dev	Min	Max	Observation
ΔASP_housing	0.092	0.093	-0.480	0.449	465
ΔASP_resid	0.093	0.097	-0.601	0.456	465
ΔASP_office	0.086	0.271	-1.073	1.553	453
ΔASP_business	0.080	0.189	-1.008	1.452	462
ΔLoan	0.149	0.077	-0.348	0.484	496
ΔSA_housing	0.136	0.224	-1.188	0.996	465
ΔSA_resid	0.134	0.229	-1.186	0.993	465
ΔSA_office	0.144	0.568	-1.945	2.602	453
ΔSA_business	0.135	0.380	-2.530	2.153	462
ΔGRP	0.133	0.052	-0.006	0.279	496
Inflation	0.021	0.022	-0.033	0.101	527
ΔPopulation	0.007	0.012	-0.057	0.056	465

Table 3. Results of OLS Regressions on Average Selling Price of Commercialized Buildings

	Dependent Variable: ΔASP_housing					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGRP(t-1)	0.417***		0.430***	0.317***	0.423***	0.320***
	(0.125)		(0.132)	(0.085)	(0.134)	(0.084)
Inflation(t-1)	-0.417		-0.404		-0.393	
	(0.265)		(0.333)		(0.336)	
ΔPopulation(t-1)	-0.288		-0.530			-0.502
	(0.362)		(0.413)			(0.409)
ΔLoan(t-1)		0.235***	0.232***	0.239***	0.226***	0.245***
		(0.044)	(0.045)	(0.043)	(0.042)	(0.047)
ΔSA_housing(t-1)		-0.013	-0.028	-0.014	-0.026	-0.016
		(0.021)	(0.025)	(0.021)	(0.025)	(0.021)
constant	0.047***	0.059***	0.015	0.014	0.012	0.016
	(0.014)	(0.006)	(0.013)	(0.013)	(0.013)	(0.013)
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
# Region	31	31	31	31	31	31
Observation	434	434	434	434	434	434
Within R^2	0.032	0.031	0.065	0.058	0.063	0.061
Between R^2	0.007	0.001	0.004	0.000	0.001	0.010

Note. Standard errors clustering at provincal-level regions are reported in parenthesis. ***, ** and * denote signifinance at the 1, 5 and 10 percent levels respectively.

Table 4. Results of OLS Regressions on Average Selling Price of Commercialized Residential Buildings

	Dependent Variable: ΔASP_resid					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGRP(t-1)	0.481***		0.494***	0.349***	0.485***	0.353***
	(0.121)		(0.131)	(0.081)	(0.135)	(0.079)
Inflation(t-1)	-0.498*		-0.523		-0.507	
	(0.266)		(0.330)		(0.337)	
ΔPopulation(t-1)	-0.456		-0.650			-0.610
	(0.503)		(0.547)			(0.540)
ΔLoan(t-1)		0.179***	0.174***	0.183***	0.167***	0.190***
		(0.046)	(0.046)	(0.044)	(0.043)	(0.048)
ΔSA_resid(t-1)		-0.004	-0.023	-0.005	-0.020	-0.007
		(0.019)	(0.022)	(0.018)	(0.022)	(0.019)
constant	0.044***	0.069***	0.021	0.019	0.017	0.022*
	(0.014)	(0.006)	(0.012)	(0.012)	(0.012)	(0.012)
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
# Region	31	31	31	31	31	31
Observation	434	434	434	434	434	434
Within R^2	0.037	0.016	0.054	0.045	0.051	0.048
Between R^2	0.007	0.001	0.003	0.000	0.004	0.017

Note. Standard errors clustering at provincal-level regions are reported in parenthesis. ***, ** and * denote signifinance at the 1, 5 and 10 percent levels respectively.

Table 5. Results of OLS Regressions on Average Selling Price of Commercialized Office Buildings

	Dependent Variable: ΔASP_office					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGRP(t-1)	1.050***		0.965***	0.745***	0.973***	0.735***
	(0.285)		(0.271)	(0.232)	(0.263)	(0.235)
Inflation(t-1)	-1.238		-0.862		-0.853	
	(0.853)		(0.929)		(0.925)	
ΔPopulation(t-1)	1.854***		1.580**			1.562**
	(0.615)		(0.580)			(0.609)
ΔLoan(t-1)		0.497***	0.448**	0.506***	0.468**	0.486***
		(0.179)	(0.173)	(0.172)	(0.174)	(0.172)
ΔSA_office(t-1)		0.014	0.012	0.015	0.011	0.016
		(0.028)	(0.031)	(0.029)	(0.031)	(0.029)
constant	-0.036	0.016	-0.102**	-0.090*	-0.094*	-0.098*
	(0.032)	(0.028)	(0.047)	(0.048)	(0.046)	(0.048)
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
# Region	31	31	31	31	31	31
Observation	423	422	422	422	422	422
Within R^2	0.027	0.015	0.039	0.034	0.037	0.036
Between R^2	0.065	0.181	0.211	0.154	0.158	0.207

Note. Standard errors clustering at provincal-level regions are reported in parenthesis. ***, ** and * denote signifinance at the 1, 5 and 10 percent levels respectively.

Table 6. Results of OLS Regressions on Average Selling Price of Commercialized Business Buildings

	Dependent Variable: ΔASP_business					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGRP(t-1)	0.536**		0.488**	0.626***	0.485**	0.629***
	(0.215)		(0.218)	(0.122)	(0.219)	(0.121)
Inflation(t-1)	0.393		0.515		0.515	
	(0.526)		(0.547)		(0.551)	
ΔPopulation(t-1)	-0.679		-0.398			-0.394
	(0.604)		(0.591)			(0.582)
ΔLoan(t-1)		0.169*	0.202*	0.178*	0.197*	0.182*
		(0.099)	(0.110)	(0.104)	(0.107)	(0.107)
ΔSA_business(t-1)		0.071*	0.071*	0.067	0.072*	0.067
		(0.039)	(0.040)	(0.039)	(0.040)	(0.040)
constant	0.001	0.048	-0.035	-0.040*	-0.037	-0.038*
	(0.019)	(0.012)	(0.022)	(0.022)	(0.023)	(0.021)
Fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
# Region	31	31	31	31	31	31
Observation	432	430	430	430	430	430
Within R^2	0.028	0.026	0.056	0.053	0.056	0.054
Between R^2	0.025	0.149	0.059	0.069	0.087	0.046

Note. Standard errors clustering at provincal-level regions are reported in parenthesis. ***, ** and * denote signifinance at the 1, 5 and 10 percent levels respectively.