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An Economic Analysis of Housing Market instability and Affordability in China

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An Economic Analysis of Housing Market instability and Affordability in China

Abstract

Applying an intertemporal optimization model proposed by Aizenman and Marion (1991), this research quantifies instability in the Chinese housing market. Although the Chinese government established numerous real estate policies to ensure the stability of the housing market, the regression analyses indicate that housing policies had no significant impact on the stabilization of the Chinese housing market. Alternatively, macroeconomic factors are identified as significant explanatory variables to the instability of housing prices. In addition, this research computes the median multiple for major cities in China and provides an alternative means of investigating the abnormal housing price situation in China.

Keywords

China, Housing market

Introduction

Before 1978, most people in urban China were housed by the welfare housing system in which the government, or state-owned enterprises, produced and allocated housing almost free of charge (Zhang, 2000). However, the welfare housing system could not be sustained economically. In order to solve the housing shortage and the financial deficit in housing development, the former Chinese leader, Deng Xiaoping, set the objectives of China's housing restructuring program. As a result of housing reform, the public housing system ended in 1998, and today houses are no longer built or controlled by the government. (Hui, 2013). According to James, Michael and Tong's (2012) research, approximately 80% of all Chinese houses were privately owned by the early 2000s. Then, a housing boom occurred. Simultaneously, many Chinese municipal governments supported local housing market expansion to promote GDP growth (James, Michael and Tong, 2012). However, even though the housing boom stimulated the local economy, as shown in Figure 1, an abnormal housing price index movement is clearly observable between 2005 and 2010.

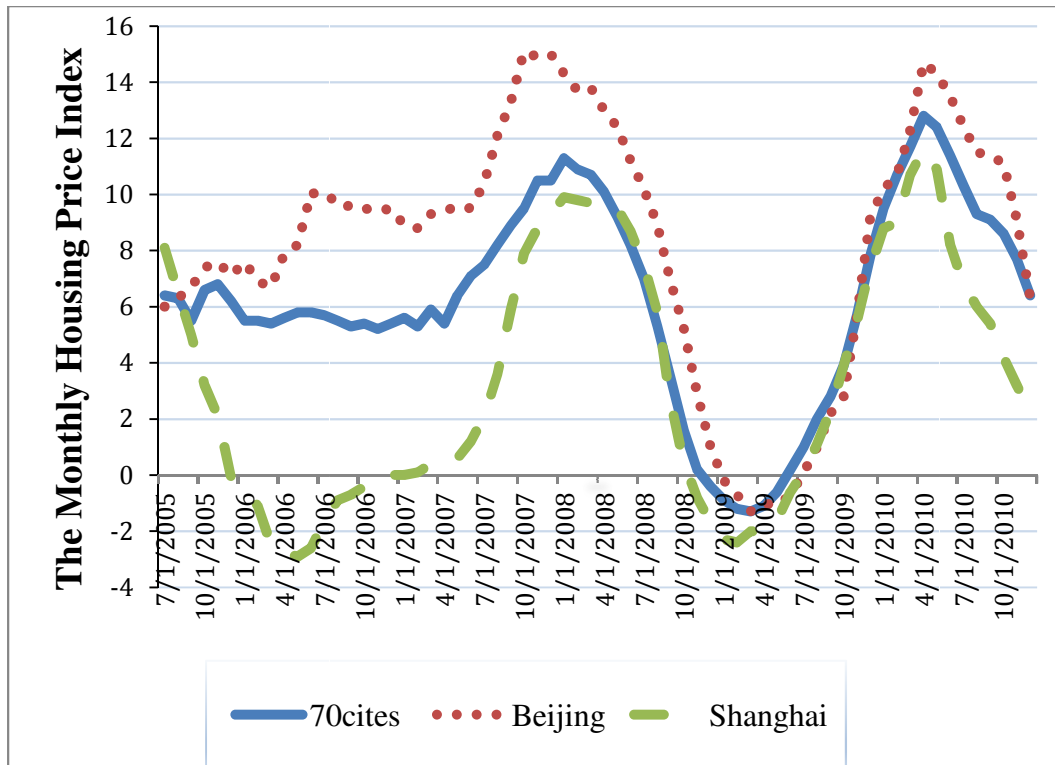


Figure 1. Trends in the monthly Housing Price Index, 2005-2010, China. **Source:** National Bureau of Statistics of China

Along with the decrease in housing market stability, Chinese housing prices are rising rapidly. In China, the national average housing price appreciated at least 10% per year between 2003 and 2010 (Jing, Joseph and Yongheng, 2010).

According to the latest report published by the National Bureau of Statistics of China, housing prices of residential buildings in Beijing, Hangzhou, Shanghai and Shenzhen increased by at least 20% from November 2012 to November 2013 (National Bureau of Statistics of China, 2014).

The 1997 Asian financial crisis and 2008 U.S. housing market crisis reveal that the fluctuations in housing prices not only threaten the financial well-being of corporations and households, but also have significant impacts at the macroeconomic level. In order to recapture and maintain a stable relationship between housing prices and the economy, it is necessary to investigate and diagnose factors contributing to the Chinese housing market instability. A domicile is a different commodity than other goods made and consumed by people as it satisfies a basic need—the need for shelter (Trojanek, 2013). If the government fails to meet the people's fundamental needs, housing market instability may contribute to social unrest. Therefore, the housing market situation is a serious concern.

This study applies an intertemporal optimization model and median multiple approach. This examines the impact of macroeconomic variables on housing price instability and test housing affordability in China, to assess possible explanations for the abnormal housing price movements. In this research, housing affordability is defined as a household's ability to meet housing costs relative to non-housing consumption (Hancock, 1993).

Instead of using empirical study or econometrics, many previous studies apply a theoretical approach to examine ingredients that may create housing market insatiability. For instance, Hui and Yue (2006) use theoretical analysis to measure an asset's fundamental value. The existence of price fluctuations can

ideally be implied by the relationship between real estate prices and macroeconomic variables such as the money supply, consumer price index, and GDP growth rate. However, conclusions from theoretical analysis lack the support of econometric results currently.

This study departs from previous studies by applying an econometric approach, using a linear regression model developed by Aizenman and Marion (1991). Housing instability is defined and measured by fitting a first-order autoregressive process. Furthermore, this research examines the impact of housing policies on housing price fluctuations from 2005-2010, and considers macroeconomic variables that may affect housing price instability. Lastly, this investigation measures housing affordability from 2010-2013 in major Chinese cities.

Each of the following sections will contain two subsections, housing instability and housing affordability.

Literature Review

As stated above, the literature review in this study first introduces previous researches related to the housing instability in China followed by the housing affordability.

Housing Instability

Why do many previous studies choose theoretical approaches instead of empirical or econometrics approaches? One main reason the housing market

instability itself is nonfigurative and challenging to quantify. However, several studies reveal the potential of using statistical models to analyze instability. In order to quantify the unexpected impact of government policy, Aizenman and Marion (1991) introduce a new methodology by using the standard deviation of the residual from a first-order autoregressive function as the unexpected policy component. Ali and Isse (2004) apply similar approaches to study the stability of political regimes. They test whether political freedom affects the stability of political regimes and the stability of the underlying economic policies. To calculate an uncertainty factor take the standard deviation for the unpredicted part while the autoregressive process is used in the forecasting equation.

The use of this methodology breaks the major barrier of applying a quantitative approach. Yu and Lee (2009) utilize Aizenman and Marion's computational method for measuring instability in the Korean housing market. Yu and Lee (2009) use the housing price instability variable as the dependent variable and other macroeconomic variables, such as money supply, gross domestic product, the consumer price index, return on corporate bonds, the number of building construction permits, number of orders received for building construction and housing policy, as explanatory variables. They observe the impact of housing policies and macroeconomic variables on housing price instability during the Roh Mu Hyun Administration (2003–2008) in Korea. Their results show

macroeconomic variables such as money supply and the number of building construction orders are statistically significant in all models.

Yu and Lee's (2009) research expresses the practicability of applying Aizenman and Marison's method in the housing market. However, the significant variables in the Chinese housing market are not necessarily the same as the ones found in the Korean housing market. Zhang, Hua and Zhao (2012) identify ten factors impacting the Chinese housing market: (1) household income (2) monetary policy (3) inflation or user cost (4) land price (5) exports or international trade momentum (6) Renminbi appreciation momentum (7) hot money (8) foreign reserve accumulation and credit expansion (9) stock market wealth and (10) rural–urban migration and urbanization. Later on, monetary policy, inflation, stock market wealth, rural-urban migration and urbanization and household's income are used as independent variables in this study. The absence of other potential factors is due to a lack of accessible data and variables that are difficult to quantify.

Housing Affordability

Unlike housing instability, housing affordability has a common method of calculation. The housing affordability index uses median house price divided by the non-taxed annual median household income. This ratio is called the median multiple. The World Bank and the United Nations recommends median multiples, and the Harvard University Joint Center on Housing also uses them.

Economists across the world use the median multiple to evaluate countries' urban markets. Therefore, this study is able to make the comparison between the Chinese housing affordability index and other major countries' indices. Using the median multiple, Trojanek (2013) researches housing affordability in the six biggest cities in Poland from 1997 to 2012. He makes the following assumptions in his investigation: (1) a household consists of two people who earn the average salary in a given city (2) dwellings have a floor space of 55m². Trojanek measures the housing affordability degree based on the median multiple. His analysis finds that the highest relative housing affordability occurred from 2000-2002. The annual gross income of a household was enough to purchase half of a dwelling with a floor space of 55m². Due to the rapid growth of housing prices, a decline in the level of affordability is observed between 2006 and 2007. In conclusion, his study finds an inverse relationship between household income and the degree of affordability. This indicates that increases in household income and adjustments to the price of houses contributed to gradual improvement in housing affordability since 2008.

Even though the median multiple approach is widely used for evaluating urban markets, finding the appropriate data for this method may come as a challenge to the housing market. However, Kosareva and Tumanov (2008) show the flexibility of the median multiple approach despite data shortages. Kosareva and Tumanov (2008) calculate the housing affordability index on primary and

secondary markets in Russia from 1998-2006 by using data from the Institute for Urban Economics. However, they adjust their calculations due to the lack of data on median income and median housing prices in Russia. Instead of using median house price and the non-taxed annual median household income, the housing affordability index in their research is measured by the following indicators: average price per square meter of housing, average per capita money income multiplied by three (for a family of three people), and the social standard housing area for a family of that size, which is 54m². This new method is termed the Modified Housing Affordability Index, as shown in the following equation:

$$\text{Modified Housing Affordability Index} = \frac{\text{average market value of } 54 \text{ m}^2}{\text{average family annual income}} - \text{spending}$$

Kosareva and Tumanov (2008) calculate the modified housing affordability index as the ratio of the average market value of a standard (54m²) apartment to the average annual income of a family of three minus fixed spending (necessities). Based on the modified housing affordability index, they find that in 1998, before the economic crisis, a family had to set aside all of their disposable income for 4.9 years in order to purchase standard housing at average prices. From 1999 to 2005, the situation improves, decreasing to an average of 3.9 years of disposable income. However, the affordability index rises again in 2006 to 4.7 years.

In the following section, model and regression results for housing instability are introduced, trailing it model and results for housing affordability will follow.

Housing Instability

Model

Data for this study are obtained from the National Bureau of Statistics of China and from the Shanghai Stock Exchange. As stated in the literature review, the two hypotheses are: (1) macroeconomic factors exert a significant positive impact on the instability of the Chinese housing market (2) housing policies had no impact on the Chinese housing market.

To test the hypotheses, an intertemporal optimization model is used. Intertemporal models specifically include equations describing how the economy evolves. These allow the models to find the economy's trajectory over time (Peter, 1995). The statistical model proposed by Aizenman and Marion (1991) suggests an uncertainty factor as the standard deviation of the unpredicted part. Following their research, housing instability in this study is represented as the standard deviation of the residual from a first order autoregressive function.

The following equations obtains data that describes the Chinese economy:

In equation (1), the housing price for the a^{th} month is set as the dependent variable. The housing price for month $a-1$ is the only independent variable.

Equation (1) is the step that allows this research to quantify instability in the

housing market. It measures the standard deviation of the Chinese housing price's residual term. Variable μ is later used in equation (2) as the dependent variable.

The first regression follows:

$$Y_a = \beta_0 + \beta_1 Y_{a-1} + \mu \text{ ----- Equation (1)}$$

- Y_a = Housing price of the ath month.
 Y_{a-1} = Housing price of the month a-1.
 β_1 = Autoregressive parameter.
 μ = Instability of the housing price.

Equation (2) is built in order to examine the impact of housing policies and macroeconomic variables on housing price instability. As shown in equation (2), variable μ , represents housing instability, and serves as the dependent variable. Other independent variables are introduced by Zhang, Hua and Zhao's study (2012). The independent variables in this research are: (1) Shanghai Stock Price Index (2) percentage change in the money supply (3) consumer price index for food, quarterly (4) GDP growth rate (5) number of building construction permits per month and (6) housing policy announcements, (a dummy variable 0 or 1 represents whether any housing policies are released in the current month or not). The second regression follows:

$$\mu (HIS) = C + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon \text{ ----- Equation (2)}$$

- μ = Housing price instability from Equation (1).
 C = Constant.
 X_1 = Shanghai Stock Price Index.

- X_2 = Annual change in money supply, M2
- X_3 = Consumer price index (CPI) for food.
- X_4 = Quarterly GDP growth rate.
- X_5 = Number of building construction permits per month.
- X_6 = Dummy variable for housing policy announcements by month; announcement=1, no announcement=0.
- ε = Residuals.

Table 1 defines the independent variables used in equation 2 and lists their expected signs.

Table 1: Independent Variable (equation 2) and expected signs

Variable	Definition	Expected Sign
μ	Housing price instability from Model (1)	N/A
X_1	Shanghai Stock Price Index	(+)
X_2	Money supply (M2)	(+)
X_3	Consumer price index (CPI) for food	(+)
X_4	Quarterly GDP growth rate	(+)
X_5	Number of building construction permits per month	(+)
X_6	Dummy variable for housing policy announcements by month; announcement=1, no announcement=0	N/A

All coefficient signs are expected to be positive. A description for each contest follows. (1) **Money supply**: As Lastrapes (2002) points out, an increase in the money supply may increase housing prices with a reduction of interest rates and user costs. Furthermore, an increase in the money supply induces housing demand; consequently, the housing price increases when money supply increases. (2) **Consumer price index**: Under the high inflation expectations in China, the inflation-hedging abilities of Chinese real estate is earning more attention than ever (Zhou and Clements, 2010). Investors are expected to find an asset that provides an inflation hedge when the food prices level rises. When the CPI-Index increases, the demand for real estate strengthens and housing prices go up. (3) **GDP growth rate**: Theoretically, GDP exhibits a positive sign on housing prices. It increases consumer confidence as well as household incomes, which hypothetically should increase housing demand. As housing demand increases, housing prices rise (Egert and Mihaljek, 2007). (4) **Number of building construction permits**: An increase in the number of construction permits increases the supply of housing, prompting consumers to invest in the housing market. Thus, as housing demand increases, housing prices also increase (Yu and Lee, 2010). (5) **Shanghai Stock Price Index**: Zhang, Hua and Zhao (2012) find housing prices increase household stock wealth increases.

In addition to these five macroeconomic variables, this research includes a dummy variable of government housing policies, introduced each month. The working hypothesis is that the housing policy announcements do not affect fluctuations in housing prices in China, which is supported by historical events. On August 2003, the General Office of the State Council of the People's Republic of China released a document entitled, "State Council on promoting the sustained and healthy development of the real estate market". This document indicates the real estate industry became a pillar industry of the national economy. Chinese governments at all levels emphasize improving regulatory policies on residential housing by adjusting the land supply and standardizing the housing credit market. One month later, The Ministry of Land and Resources of the People's Republic of China released a notification about strengthening the land supply administration in order to promote sustainable and healthy development of the real estate market. However, as shown in Hui and Yue's (2006) research, the housing price in Shanghai is 22 % higher than the value of the market fundamentals during the housing market boom in 2003.

From 2003 to 2013, the Chinese government announced several new policies. These official policies originated from different governmental branches. However, they all have the common purpose of stabilizing the housing market. Due to limited data, only the period from July 2005 to November 2010 is covered by this research. Fifty-five policies announced during the observation period are

included in this research. Therefore, a month with at least one new policy announcement counts as an announcement month (dummy variable =1). By contrast, a month without any new policy announcement is assigned a dummy variable of 0.

Results

The results of three regression models are reported by location (70 Chinese cities, Beijing and Shanghai) and displayed in Table 2. This research sets a 5-percent level of significance as its standard. As shown in Table 2, models in all locations indicate that the announcements of housing stability policies by the Chinese government have no impact on housing price instability. Using the t-test, the models detect the statistical significance of several macroeconomic variables on the stability of housing prices. GDP and money supply are statistically significant in all models. These two variables have positive correlations with housing price instability, as expected. Namely, the higher the GDP is, the less housing stability in the Chinese housing market. Yet, the increase in the money supply decreases the stability in the Chinese housing market.

Table 2: Results from Housing Instability Regression

Method:									
Least Squares		70 Cities			Beijing			Shanghai	
Variable	Coefficient	t-Statistic	VIF	Coefficient	t-Statistic	VIF	Coefficient	t-Statistic	VIF

	ic			c			c		
C	-	-	NA	-	-	NA	-11.837	-	NA
	8.90081	6.279		12.8522	4.2357			4.8145	
	3	1		2	79				
BUILDING	-	-	2.547	0.02127	0.3491	2.547	-0.0316	-	2.547
	0.01780	0.625	52	5	98	52		0.6403	52
	1	4							
CPIF	-	-	2.240	-	-	2.240	-0.0316	-	2.240
	0.02782	0.713	44	0.11633	1.3926	44		0.4667	44
	9	1		3	28				
GDP	0.40931	4.285	3.516	0.57862	2.8300	3.516	0.44229	2.6697	3.516
	4	12	67	8	26	67		3	67
M2	0.24096	6.469	2.397	0.34357	4.3091	2.397	0.32109	4.9700	2.397
	3		62	5	56	62		9	62
POLICY	-	-	1.310	0.23929	0.4758	1.310	0.4369	1.0721	1.310
	0.01992	0.084	02	2	22	02		9	02
	8	8							
SHANG	0.00013	1.098	1.785	6.65E-	0.2625	1.785	0.00054	2.6470	1.785
		9	5	05	83	5		6	5
R-squared	0.79921			0.63166			0.77191		
	7			2					
Adjusted R-squared	0.71890			0.48432			0.68068		N=63
	4			7					

There are two explanations that might explain the lack of a significant relationship between governmental housing stability policies and housing prices. First, most of the housing polices announced by the Chinese central government try to restrict speculative property investments to mitigate the possibility of a housing bubble. However, statistical analysis reveals that the housing price

fluctuation is likely caused by macroeconomic factors. In other words, unhealthy speculative property investments are not the only major factors influencing the housing price. Although the Chinese central government announced housing policies as many as 55 times between 2005 and 2010, local protectionism may limit the efficacy of China's central government. Many Chinese municipal governments support local housing market expansion to ensure local GDP growth (James, Michael and Tong, 2012). Thus, government-housing policies do not reflect the impact of the political opposition that surfaced during the legislative process.

Compared with the first two regressions (70 Chinese cities and Beijing), the statistical results from the Shanghai model are slightly different. Besides GDP and money supply, the Shanghai Stock Index is also statistically significant in this model. The following factors may explain why the Shanghai Stock Index is only statistically significant in the model of Shanghai. First of all, Shanghai is China's financial and trade center. The Shanghai stock exchange lists around 1700 companies and has a market capitalization of \$3.57 trillion (the World Federation of Exchanges, 2009). The whole city is connected directly with China's financial market. Second, based on the Shanghai Municipal Statistics Bureau, the local residents also have the highest urban disposable income among 31 provinces on the Chinese mainland. Therefore, people who live in Shanghai enjoy a geographical advantage (living in China's financial capital), and also have a

higher potential ability to invest in the stock market. These two factors lead one to conjecture that stock market wealth plays a significant role in pushing up housing prices in Shanghai.

Due to the potential for multicollinearity, Variance Inflation Factor (VIF) tests are conducted in my research. The results for VIF tests are in the right-most column of the results table. Based on the VIF tests, no significant multicollinearity exists since none of the VIFs are above 5.

Using the statistical model proposed by Aizenman and Marion (1991), this study focuses on whether the macroeconomic level factors have an impact on housing price fluctuations in China. The results of the regression analysis support the hypothesis, which is housing policy announcements have no significant impact on the stabilization of the Chinese housing market. On the other hand, this study finds that the growth rates of GDP and the money supply are significant explanatory variables for the instability of housing prices in all locations studied. Another factor, the Shanghai Stock Index, also has a statistically significant impact on price instability in Shanghai's housing market model.

Housing Affordability

Model

As stated in the introduction and literature review, this study measures housing affordability in China by using the median multiple approach.

Observations cover the national averages of Beijing and Shanghai. The primary

reason this study uses the median multiple is due to its popularity among international organization (The United Nations and the World Bank) and its flexibility when data limitations exist (Alain, 2014).

As shown in equation 3, the median multiple is the ratio of average house prices divided by annual median household income. Based on the existing data and previous research, the following assumptions and adjustments for the median multiple are made: (1) 55m² is the standard size for housing in this study. (2) For most Chinese households, purchasing housing is a family activity instead of individual behavior. This study assumes that each household contains two working family members. (3) Observations include households in urban areas only.

Equation 3:

$$\text{Median Multiple} = \frac{\text{Monthly Median House Price per meter} * 55 \text{ m}^2}{\text{Median Annual Personal Income} * 2}$$

Housing affordability ratings are assigned based on the median multiple results, which are as shown in Table 3:

Table 3: Ratings of Housing Affordability Index

Rating	Median Multiple (Housing affordability index)
Affordable	≤ 3.0
Moderately Unaffordable	3.1-4.0
Seriously Unaffordable	4.1-5.0
Severely Unaffordable	≥ 5.1

Source: Radosław, Trojaneek. *“Housing Affordability in Poland”*, 2013.

Data

Monthly median house prices per meter and median annual personal income are necessary in order to apply the median multiple approach. Therefore, this research collects monthly median house prices per meter from the China Real Estate Index System (CREIS). Then, it introduces national average annual median resident’s income in urban areas from the National Bureau of Statistics. Furthermore, Beijing and Shanghai’s annual median resident’s income are gathered from Beijing Municipal Statistics Bureau and Shanghai Municipal Bureau of Statistics.

One can question the credibility of this study due to CREIS being an independent research organization. However, CREIS’s innovative and timely analyses are quite influential to the Chinese housing industry and are quoted frequently by the Wall Street Journal. Even though all the data resources are likely valuable and trustworthy, this study still faces several consequences associated with the limitations of existing data. For example, the observation time periods for China’s average housing affordability index is not available for the entire period of observation. This research is not able to provide the housing national affordability index, after December 2012. Yet, the full time range for this research is from June 2010 to December 2013. The reasons behind not having the

data to support that year, is because the central government lacks the essential data on national average annual median resident's income, in urban areas for this period of time.

Results

Equation (3) shows China's average housing affordability index is 10.45 from June 2010 to December 2012. For Beijing and Shanghai, the housing affordability indices between 2010 and 2013 are 16.18 and 11.79, respectively. In general, according to the housing affordability index ratings, shown in table 3, housing prices in China are considered unaffordable. In addition, Figure 2 displays China's monthly affordability index for three different locations (Chinese national average, Beijing and Shanghai) from 2010 to 2013. Changes in housing affordability for all three locations follow the same pattern and the year 2012 has the lowest affordability indices for all observations. However, using China's average housing affordability index as the standard mark, Shanghai's housing affordability situation is better than that of Beijing. Furthermore, The housing affordability index of Beijing has always been the highest since June 2010. Overall, a small, gradual improvement in the housing affordability indices is observed, which likely is due to increases in median household income.

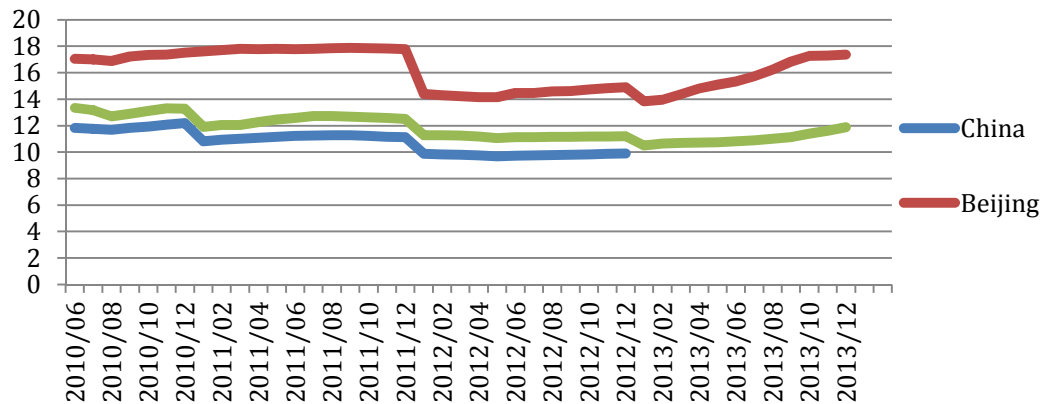


Figure 2. Housing Affordability Index in China, 2010-2013.

In order to gain a better picture about housing affordability in China, further comparisons are introduced in this study. As shown in table 4, this study compares other countries and cities’ housing affordability indices in 2013 from Alain’s research (2013) after calculating the average affordability index for Beijing, Shanghai and China.

Table 4: Housing Affordability Index, 2013

Nation	Affordability Index	Cities	Affordability Index
Australia	6.3	Beijing	16.18
China	10.45	Hong Kong	14.9
Canada	4.5	Los Angeles	7.9
Ireland	3.7	London	7.3
Japan	4.0	San Francisco	9.2
New Zealand	8.0	Shanghai	11.796
Singapore	5.1	Sydney	9.0
United Kingdom	4.7	Tokyo- Yokohama	4.4
United States	3.5	Vancouver	10.3

Source: Alain Bertaud, “10th Annual Demographia International Housing Affordability Survey”, 2014 & Author’s own work

According to Table 4, compared with Australia, Canada, Ireland, Japan, New Zealand, Singapore, the United Kingdom and the United States, China has the least affordable housing market. In addition, China’s cities, Beijing and Shanghai, also have relatively high affordability indices. This comparison suggests Chinese people face a housing market with lower affordability than people from countries with higher annual incomes.

Research Limitations

The research limitations section covers the models, the housing instability and the housing affordability. The following section has suggestions and opinions that provide potential opportunities for ongoing research.

Housing instability

First, the housing instability model applied in this research examines whether Chinese housing policies have an observable impact on housing price instability during the same time period policies are announced. However, the model is not designed to identify long-term, cumulative effects of the housing policies. Second, speculation activities in the Chinese housing market are not covered by this study due to lack of accessible data and difficulty in quantification. However, Zhang, Hua and Zhao (2012) and Hui and Yue (2006) both indicate speculation is responsible for Chinese housing price instability. Third, this

research does not differentiate the Chinese central government's housing policies by type, scale, or any specific implementation (Le and Yu, 2010).

Housing Affordability

Compared with previous studies, this research contains a relatively small sample size and a short observation time period; however, as shown in figure 2, the housing affordability indices for China, Beijing, and Shanghai decline between the end of the fourth quarter (December) and the beginning of the first quarter (January) in nearly every year. Therefore, the affordability index may need to be seasonally adjusted in future studies.

Furthermore, the median multiple does not include any other factors that may influence housing affordability. As Liu (2014) mentions in his research, by contrast with people from the United States and other developed countries, Chinese households have relatively high savings rates. Therefore, even though Chinese households have lower annual incomes, they may have a better financial or savings plan to support housing purchases. Another factor not captured by the median multiple is cultural. Often when Chinese families purchase a house, there is significant financial support from family elders. Thus, the savings rate and culture impacts are possible factors to consider in future analyses.

Conclusion

The regression results show that growth in GDP and the money supply have a statistically significant (at the 5% level) impact on the Chinese housing

market. The evidence suggests Chinese housing instability and rapidly increasing house prices are possibly due to the combination of effects from these two macroeconomic variables. A possible explanation for this abnormal housing market movement is an increase in the money supply, which shifts the LM curve to the right, lowering interest rates and raising equilibrium national income (Robert 2009). Investors are also joining the housing market due to low interest rates. At the same time, the high GDP growth rate also increases consumer confidence as well as household incomes (Egert and Mihaljek, 2007). Therefore, Chinese residents are more likely to purchase houses when household incomes are rising and consumer confidence is high. Large cash flows and increased housing demand both have the potential to decrease housing stability and increase prices.

On the other hand, there are other factors more difficult to assess. The actual affordability of housing is potentially better than the housing affordability index shows when considering factors such as high saving rates and financial support from older generations. There is one other concern. According the National Bureau of Statistics of China, average annual income for a Chinese family is about \$2,100 in 2013. However, the average annual income in Shanghai is about \$4,700, while the average in Gansu Province is under \$2,000. In addition, average family incomes in urban areas are about \$2,600, compared to \$1,600 in rural areas (National Bureau of Statistics of China, 2014). The large income gap in China makes housing more affordable for high-income families, while for

middle or low-income households in China, the price is reaching their financial limit. Further research that adopts factors such as the GINI index could provide more concise conclusions and recommendations in relation to housing affordability in China.

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