

China Housing Market: Boom or Bubble?

Wesley Liang

Senior Seminar in Economics

Gary Smith

Pomona College

Spring 2019

ABSTRACT

China has seen extraordinary economic growth for the last two decades, coupled with a booming housing market. Several years following the 2008 financial crisis, however, the international community began to scrutinize the Chinese property market for fear of a housing bubble – the specter of the U.S. housing crisis was still salient. This thesis therefore explores the condition of the current Chinese real estate market by first examining the various causes that drove the rapid rise in property prices, both on the demand-side and supply-side for housing. Second, it investigates whether a bubble exists in the current state of housing prices in Beijing and Shanghai using fundamental analysis of matched pairs of property-level sales and rental price data. The data reveal a bubble in both housing markets, although to differing degrees – the Beijing housing market appears much more frothy than the Shanghai market. The paper then concludes with a discussion of the potential consequences of a housing price collapse based on the results of the bubble analysis.

Introduction

In the aftermath of the 2008 global financial crisis, the Chinese government introduced a 4 trillion RMB (586 billion USD) stimulus package to help restore growth in its economy. As the economy recovered, however, China's debt ballooned from 171% of GDP in 2008 to 299% of GDP by 2018 – rapid economic recovery and growth had occurred at the cost of incurring the country a massive amount of government-funded domestic debt.¹ This development is largely fueled by the real estate sector, unregulated shadow banking and local Chinese government debt.²

In recent years, over a quarter of China's GDP has been tied to the property and construction sectors.³ This relationship has important consequences – if the property market is in fact overheated, a collapse in real-estate prices can trigger an economic crisis in not only China but around the world. China is the largest trading country in the world with combined exports and imports worth \$4.3 trillion, and is currently the top trading partner for 16 Asian countries, which means a potential property market-induced economic crisis in China would have far-reaching consequences for the health of the global economy.^{4,5} This thesis therefore examines China's property boom, specifically by contextualizing the rapid rise in housing prices observed in the Chinese property market over the last two decades and using fundamental analysis of

¹ Khadija Mahmood and Emre Tiftik. "Global Debt Monitor: Devil in the Details." *Institute of International Finance* (2019).

² Richard Dobbs, Susan Lund, Jonathan Woetzel, and Mina Mutafchieva. "Debt and (not much) deleveraging." *McKinsey Global Institute* (2015).

³ Tom Nunlist. "China's Housing Market: The Iron Bubble." *Cheung Kong Graduate School of Business Knowledge* (2017).

⁴ Mark Thirlwell. "The world's leading trading nations." *Australian Trade and Investment Commission* (2015).

⁵ Fang Tian. "China rises to 16 Asian countries' biggest trading partners." *People's Daily* (2018).

property prices in Beijing and Shanghai to determine whether and to what extent China's largest housing markets are overheated.

As defined by Smith and Smith (2006), a housing bubble occurs when housing market prices rise substantially above their fundamental values. The fundamental value of a home can be understood as the earnings capacity of an asset, or the present value of the asset's expected future cash flow. For real estate assets, cash flow is implicit – if a person buys a home to live in, the anticipated future cash flows from purchasing this home is the rent the person would have otherwise had to pay, net of home ownership expenses. However, this assumes buying and renting are perfect substitutes when there are several different considerations involved. For instance, renting is a better option for younger people who are still unsure of where to settle down, and buying is more attractive for those that want to start or already have a family.

While differences do exist between buying and renting, Smith and Smith explain that they are close enough substitutes if location, size, property age, and other physical attributes are controlled for. Moreover, most of these differences tend to result in an underestimation of the value of home ownership. For example, home owners have more flexibility than do renters in tailoring their homes to their liking with renovations. Thus overall, even with these variations in preference, buying and renting homes are similar enough for the purpose of fundamental analysis. As such, data on sales price and rental price of nearly identical properties can be used to find whether current market prices of homes are above or below fundamental values.⁶

An understanding of the current level of China's property prices, especially in the largest cities where bubbles are most likely to occur, will help China and the rest of the world decide whether the nation's real estate sector should be a serious matter of concern. There are many that

⁶ Margaret Hwang Smith and Gary Smith. "Bubble, bubble, where's the housing bubble?" *Brookings Papers on Economic Activity* 2006, no. 1 (2006).

find the current state of the Chinese real estate market extremely worrying, and point to the rapid growth in property prices as a sign of a housing bubble. From 2003 to 2013, China's largest cities – Beijing, Shanghai, Guangzhou and Shenzhen – experienced real property price growth of 13.1% annually. These four major cities are commonly categorized as first-tier cities. China's real estate market also includes second-, third- and fourth-tier cities. Tier two includes most of the country's provincial cities, and tiers three and four include the remaining medium and small cities. Over the same period, China's second-tier and third-tier cities experienced real price growth of 10.5% and 7.9%, respectively.⁷ In addition to the rapid rise in property prices, growing bad credit exacerbated by unregulated shadow banking and a cooling economy in recent years has also contributed to the speculation about a real estate bubble that could collapse. As such, some observers, such as Chinese billionaire and real estate magnate Wang Jianlin, warn that Chinese real estate is the “biggest bubble in history.”⁸

On the flipside, there are people who view these worries as far overblown, arguing that many are observing China's housing price growth out of context. Chen and Wen (2017) offer an interesting perspective on the Chinese housing market – while it exhibits frothy behavior, it is only problematic under certain circumstances. The authors argue that China's housing boom and its bubble-like characteristics are natural given the rapid expansion, industrialization and urbanization of the economy; rational expected future demand for property inevitably causes people to speculate in the market. The problem only arises when economic growth slows but future expectations for price growth continue to remain high.⁹ Others highlight the significant

⁷ Dinny McMahon. “China's Great Wall of Debt: Shadow Banks, Ghost Cities, Massive Loans, and the End of the Chinese Miracle.” *Houghton Mifflin Harcourt*, (2018): 86.

⁸ Jethro Mullen, and Andrew Stevens. “Billionaire: Chinese real estate is ‘biggest bubble in history’.” *CNN Business* (2016).

⁹ Kaiji Chen and Yi Wen. “The great housing boom of China.” *American Economic Journal: Macroeconomics* 9, no. 2 (2017).

growth in disposable incomes that has accompanied the rise in property prices, which makes the observed increase in prices not quite as striking.¹⁰

Lastly, the nature of China's housing boom is very different from that of the U.S. preceding the housing market collapse in 2008. The primary cause of the American housing bubble crash involved lax mortgage lending standards, low interest rates and extremely low down payment requirements. Prior to the housing collapse, the 1995 Community Reinvestment Act, meant to encourage banks to lend more to low-income households to boost home ownership, caused many banks to lower their mortgage lending standards in order to meet the requirements of the Act.¹¹ Consequently, subprime lending surged and by 2008 just before the crisis, more than half of all mortgages in the U.S. were subprime and had down payments of near zero percent.¹² China's housing market does not face the same issue; there are much stricter mortgage lending standards and down payment requirements – a 30 percent down payment is required for the purchase of a first home and a 60 percent down payment is required for any subsequent home purchases.¹³

As there still exists many divergent opinions on the condition of the Chinese property market, this paper contributes to the literature by conducting a fundamental analysis of current housing prices in two major Chinese housing markets Beijing and Shanghai to determine the severity of the housing boom. First, to understand the causes and consequences of the rapid growth in property prices, both demand and supply side factors in the real estate markets are

¹⁰ Hanming Fang, Quanlin Gu, Wei Xiong, and Li-An Zhou. "Demystifying the Chinese housing boom." *NBER macroeconomics annual* 30, no. 1 (2016).

¹¹ Jeff Holt. "A summary of the primary causes of the housing bubble and the resulting credit crisis: A non-technical paper." *The Journal of Business Inquiry* 8, no. 1 (2009).

¹² Peter J. Wallison. "A crisis caused by housing policies, not lack of regulation." *American Enterprise Institute* (2017).

¹³ Yangpeng Zheng. "Beijing rolls out harshest ever home buyer down payment levels." *South China Morning Post* (2017).

analyzed, which include China's financial system, political structures, culture of homeownership and history of property rights. Next, pair-matched property-level sales and rental price data from Beijing and Shanghai are used to investigate whether a bubble exists in the current state of housing prices, and if so, whether it is a bubble on the verge of collapse or an overheated but manageable market. The paper then concludes with a discussion of the potential consequences of the increase in housing prices based on the results of the bubble analysis and the special features of the Chinese context.

Demand-side Factors Driving the Rapid Growth in Property Prices

Privatization of the Chinese Property Market in 1998

China's transition from a centrally planned, state employer-provided housing economy to a liberalized housing market in 1998 marked one of two key market transformations in China's history; the other was the development of the stock market since 1990. Prior to the housing market transition, China did not have a housing market, meaning the government and state-owned entities provided accommodation for the Chinese people and there was no buying, selling and renting homes between households. However, the Chinese State Council decided in 1998 to privatize the property market because development of housing was increasingly deteriorating under state control.¹⁴ This transformation was also an effort to establish the sector as a new means for economic growth in the aftermath of the 1997 Asian Financial Crisis.¹⁵ This constitutional amendment set forth a wave of state firms selling homes at highly discounted prices to their employees, followed by a surge in housing construction as private demand for

¹⁴ Xiaoqing Eleanor Xu and Tao Chen. "The effect of monetary policy on real estate price growth in China." *Pacific-Basin Finance Journal* 20, no. 1 (2012).

¹⁵ Fang, Gu, Xiong, and Zhou. "Demystifying the Chinese housing boom." (2016).

housing leaped.¹⁶ Those who bought homes at a steep discount during the initial years of the newly privatized housing market were particularly fortunate – as prices rose rapidly, they were able to resell their homes at much higher prices and receive large capital gains, allowing them to upgrade their living standards. From 1998 to 2010, the annual volume of completed private housing units rose from 140 million square meters to over 610 million.¹⁷ As residential housing construction and prices grew swiftly to meet public demand, the Chinese real estate market has only boomed since the late 1990s, interrupted by occasional blips in the market.¹⁸ Consequently, the enormous growth of housing prices in the last two decades can partially be attributed to the privatization of the housing market that only began to develop in the late 1990s.

A Robust and Urbanizing Economy

Since opening up to trade and beginning to adopt free market reforms in the 1980s, China has sustained an incredible rate of economic expansion, averaging 9.5 percent real annual GDP growth through 2017. This expansion has helped raise approximately 800 million people out of poverty, transforming one of the poorest countries to one of the top economic powerhouses in the world, second only to the United States.¹⁹ Combined with a 1.3 billion population and a large emerging middle class, it comes as less of a surprise that property prices have grown so much over the last two decades. Furthermore, continued urbanization since the 1980s has substantially contributed to the housing boom.²⁰ The combination of a massive population, growing

¹⁶ Shang-Jin Wei, Xiaobo Zhang, and Yin Liu. "Home ownership as status competition: Some theory and evidence." *Journal of Development Economics* 127 (2017).

¹⁷ Jing Wu, Yongheng Deng, and Hongyu Liu. "House Price Index Construction in the Nascent Housing Market: The Case of China." *The Journal of Real Estate Finance and Economics*, Springer, vol. 48.3 (2014).

¹⁸ Dinny McMahon. "China's Great Wall of Debt." (2018): 84-85.

¹⁹ Wayne M. Morrison. "China's economic rise: history, trends, challenges, and implications for the United States." *Library of Congress, Congressional Research Service* (2013).

²⁰ Wu, Deng, and Liu. "House Price Index Construction." (2014).

disposable incomes and rapid rural-urban migration naturally drove greater demand for housing, especially in more desirable and highly urbanized areas. In the first-tier cities, the total population rose from 48 million to 70 million from 2004 to 2012 – a 4.8 percent annual growth compared to the 0.5 percent annual population growth in China over the same period. Total population in second-tier cities rose 2.1 percent annually, and third-tier cities grew at roughly the same pace as population growth.²¹

Lack of Investment Alternatives

In China, real estate is considered a primary vehicle for investment. China's financial system is still not quite mature, and there are few accessible and stable means of investment in the country. Thus, real estate has become one of the best places to invest one's savings. China's stock and bond markets are still relatively volatile, as demonstrated in the recent Chinese stock market collapse in June 2015, when new credit and speculation pumped up the market by 150 percent in less than a year before a third of the value of A-shares on the Shanghai Stock Exchange was wiped out within a month.²² Stock market volatility can be attributed to the still nascent nature of the Chinese stock market, as well as the significantly larger percentage of individual investors compared to institutional investors in the market. 80 percent of the trading volume on the Shanghai Stock Exchange are composed of individual investors, whose trading behavior are generally less informed and more unpredictable.²³ In contrast, in the U.S.

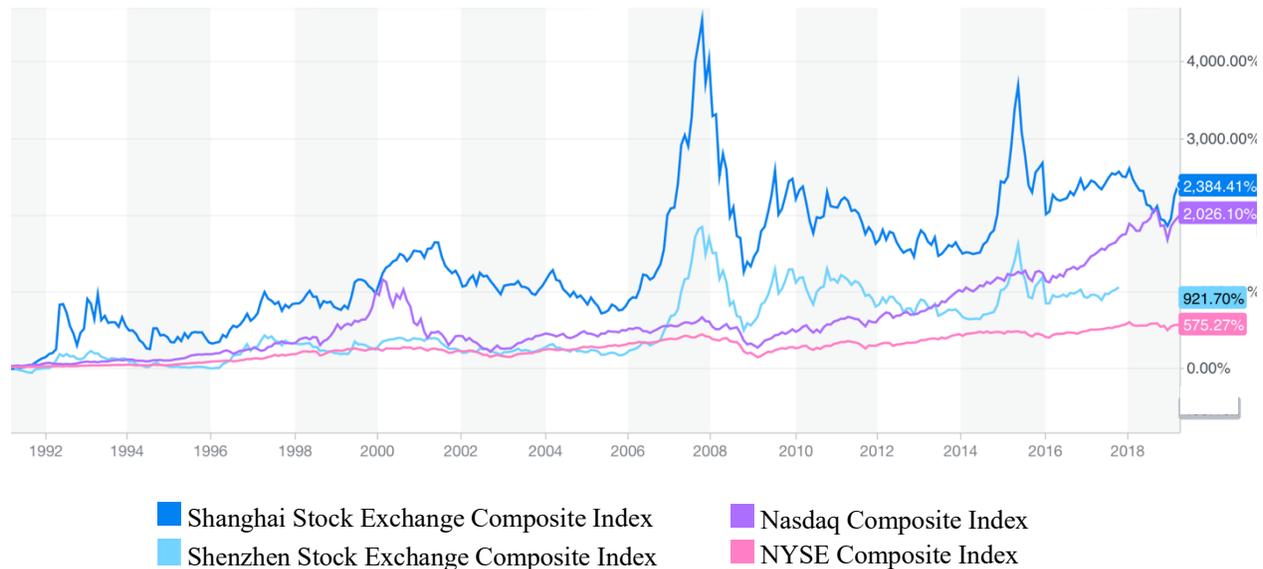
²¹ Fang, Gu, Xiong, and Zhou. "Demystifying the Chinese housing boom." (2016).

²² Dinny McMahon. "China's Great Wall of Debt." (2018).

²³ Daniel Ren. "Stronger efforts called for at educating China's 100 million retail investors." *South China Morning Post* (2017).

institutional investors account for over 70 percent of the trading volume on the American stock exchanges.²⁴

Figure 1. U.S. and China Stock Exchange Composite Indexes



Source: Yahoo Finance

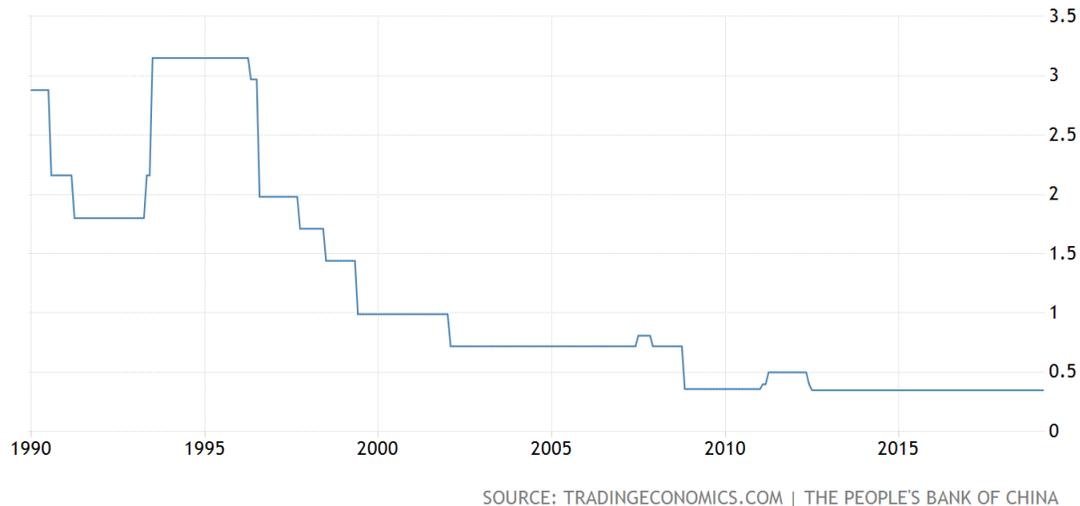
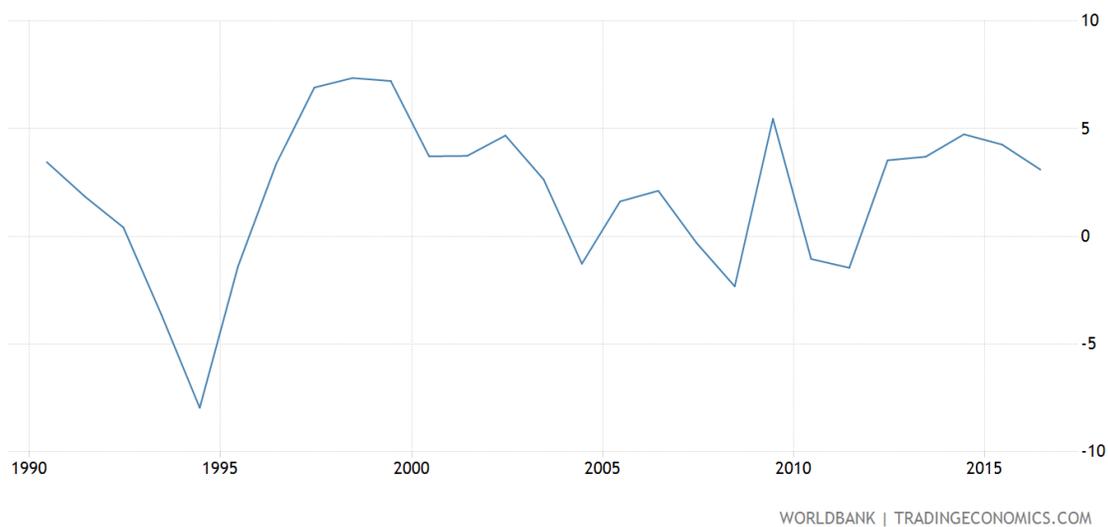
In addition to greater volatility, the stock market is still poorly regulated and dominated by state-owned enterprises (SOEs), and offers less attractive returns than the housing market.²⁵ On average, housing market indices across all three tiers of Chinese cities demonstrated more resiliency through the 2008-2009 global economic crisis and provided greater returns than did bank deposits and the Chinese stock market.²⁶ Furthermore, while China has slowly liberalized both its stock exchanges – the Shanghai exchange through the Shanghai-Hong Kong Connect in 2014 and the Shenzhen exchange through the Shenzhen-Hong Kong Connect in 2016, capital controls are still strict and access to investment opportunities abroad remains limited.²⁷

²⁴ “Institutional Investors: Get Smart About the “Smart Money.” *Financial Industry Regulatory Authority* (2015).

²⁵ Chen and Wen. "The great housing boom of China." (2017).

²⁶ Fang, Gu, Xiong, and Zhou. “Demystifying the Chinese housing boom.” (2016).

²⁷ “China in Transition: The Stock Connect.” *Goldman Sachs* (2016).

Figure 2. Current Deposit Interest Rate in China from 1990 to 2019 (In percent)**Figure 3.** Real Interest Rate in China from 1990 to 2016 (In percent)

China's banking system is largely designed to provide cheap and large amounts of credit to SOEs rather than meet the needs of the private sector. Over the last decade, the average annual real interest rate on bank deposits in China has fluctuated around zero, including dipping below

zero in some periods.²⁸ Figure 2 shows China's nominal deposit rate has remained at approximately 0.35 percent since October 2008, with a small rise to 0.50 percent from March 2011 to April 2012. Excluding 2011 and 2012, annual real deposit rates were on average negative over the last decade. Thus, despite relatively higher down payment and mortgage rates in China compared to the United States, the Chinese choose to invest in real estate rather than other investment alternatives because the opportunity cost of putting their savings elsewhere is much more expensive, on both a volatility and cost-basis.

Strong Culture of Homeownership

In addition to political and economic factors, a strong culture of homeownership among the Chinese has also contributed to the extraordinary growth of property prices, especially as it intersects with the new wealth generated by a robust Chinese economy in recent years. Wei, Zhang and Liu (2017) argue that homeownership status is particularly important to single men looking for marriage prospects. A considerable sex imbalance has existed in China for several decades, due largely to an ingrained cultural preference for male children, which the one-child policy enacted from 1979 to 2015 further exacerbated. One consequence of this sex imbalance is that homeownership meaningfully boosts a person's competitiveness in marriage, as it is perceived as a sign of status. The authors prove this relationship through their study of the regional differences in the sex ratio of the pre-marriage cohort in relation to the varying strengths of concern for status.²⁹

Fang, Gu, Xiong, and Zhou (2016) reached a similar conclusion in their analysis of mortgage data across China. They found that among mortgage borrowers, the fraction of single

²⁸ Edward Glaeser, Wei Huang, Yueran Ma, and Andrei Shleifer. "A real estate boom with Chinese characteristics." *Journal of Economic Perspectives* 31, no. 1 (2017).

²⁹ Wei, Zhang, and Liu. "Home ownership as status competition." (2017).

men was consistently higher than single women in second- and third-tier cities across the bottom- and middle-income borrower groups; albeit this relationship was absent in first-tier cities.³⁰ Furthermore, Yang, Zhang, and Zhou (2013) found that reduced fertility resulting from China's one-child policy contributed significantly to the recent rise in household saving. They also found that larger sex imbalance (skewed towards males) led to higher savings rates.³¹ Higher savings therefore means greater purchasing power in the real estate market, which in turn drives up housing demand and consequently prices.

Another important cultural characteristic driving up housing prices in conjunction with China's new wealth is the tendency of Chinese parents to provide financial help to their children in purchasing a home. Compared to the United States, more interdependent relationships exist between generations of Chinese families, meaning parents often provide for their children much into their adulthoods, and in old age, parents tend to depend on their children more.³² These cultural differences is reflected in a study on homeownership rates by the China Household Finance Survey in 2013 – Chinese households under the age of 35 have a homeownership rate of 55 percent, whereas for American households, that rate is only 37 percent. This statistic appears even more surprising given that house price-to-income ratio is higher in China than in the United States.³³ As such, the various aspects of homeownership culture in China play a significant role in the high home prices observed today.

³⁰ Fang, Gu, Xiong, and Zhou. "Demystifying the Chinese housing boom." (2016).

³¹ Dennis Tao Yang, Junsen Zhang, and Shaojie Zhou. "Why are saving rates so high in China?" *Capitalizing China*, University of Chicago Press (2012).

³² Glaeser, Huang, Ma, and Shleifer. "A real estate boom with Chinese characteristics." (2017).

³³ Ibid.

Strict Housing Regulations

China has numerous regulations surrounding the purchase of property, including the *Hukou* system meant to regulate population concentration and high down payment requirements meant to control for credit risk. The *Hukou* system in China is a system of provincial citizenship. This system makes it very difficult for those who hold citizenship outside of the province they work in to convert their provincial citizenship or buy property in the province they work in. Additionally, these people lack access to many public goods in the province of their workplace. The purpose of this restriction is to prevent extremely high rates of rural-urban migration to the major Chinese cities, especially given China's enormous population. Since the number of homes can only increase by so much due to spatial limitations, prices surge instead, especially in already densely populated, highly urbanized tier-one cities. High down payment requirements are another example of the Chinese government's attempt to control the housing market and reign in speculative behavior. First home purchases require a 30 percent down payment, and any subsequent home purchases range from 60 percent to 80 percent depending on the purpose of the home.³⁴ Strict housing regulations like these therefore restrain housing demand, although this effect is dwarfed by the previous factors that drive up housing demand.

Supply-side Factors Affecting Property Market

While the demand-side for housing has mostly driven up both house prices and quantity, the supply-side of the Chinese housing market has had mixed effects. Local Chinese governments' push for land sales causes an increase in quantity of housing and a decrease in housing prices, whereas land value appreciation increases housing prices.

³⁴ Fang, Gu, Xiong, and Zhou. "Demystifying the Chinese housing boom." (2016).

Land Sales to Finance Local Government Spending

The Chinese government is deeply invested in the real estate market because it plays a major role in economic growth. In China, all land belongs to the state – local governments sell “land use rights” to property developers, who buy these rights that last for several decades (typically 70 years). They then construct properties on top of the land and sell them to the public. Local governments pocket the revenues generated from the sale of land use rights, which constitutes a very large share of total local government fiscal revenues because China’s tax system provides few and relatively small channels of fiscal income. Since the central government requires local governments to achieve periodic revenue targets in order to maintain strong economic growth, local governments face substantial pressure to extract as much revenue from their few income channels, even if it entails wasteful production. As land use rights sales are a major source of local government fiscal incomes, the consequential oversupply of housing, especially in less developed Chinese cities, comes as no surprise. The widely-reported prevalence of ghost cities in China are a byproduct of these government actions. Therefore, local government incentive to push for large volumes of land use rights sales drives up housing quantity and lowers prices.

Land Value Appreciation

In China, land is much more valuable than the house that sits on top of it. Over the course of the last two decades, construction costs have remained largely stable.³⁵ On average, construction costs make up only a third of the value of a house – the rest is land value.³⁶ Since all land belong to the state, local governments determine land value as they are the ones selling the

³⁵ Jing Wu, Joseph Gyourko, and Yongheng Deng. "Evaluating the risk of Chinese housing markets: What we know and what we need to know." *China Economic Review* 39 (2016).

³⁶ Glaeser, Huang, Ma, and Shleifer. "A real estate boom with Chinese characteristics." (2017).

land use rights. Thus, obligations to meet revenue targets set by the central government also forces local governments to sell land use rights at high price levels. The extraordinary rise in property prices observed in recent years is therefore partially in consequence of state-influenced land value appreciation.

Literature Review

In this section, previous literature on the Chinese housing market are reviewed, with a focus on the different methodologies used for analyzing whether a bubble exists in the current market and the conclusions drawn from the data analysis. As discussed in the introduction, a housing bubble exists when market prices of homes stray considerably above fundamental values. The fundamental valuation model presented in Smith and Smith (2006) used in this paper is explained in detail in the following section on methodology.

In Glaeser, Huang, Ma, and Shleifer (2017), the authors compare the Chinese real estate boom with the 2007 U.S. subprime mortgage crisis by examining four aspects of housing booms – house prices, construction, vacancies and the roles of respective governments – to measure its severity. Several trends emerge from this study including relatively higher price growth and vacancy rates, but the key takeaway is while there is a possibility of a real estate collapse, the Chinese government plays a powerful role in the real estate sector and has large stakes in it. The prevailing sentiment in China is that the property market is “too important to fall,” and the government will do whatever it takes to prevent a housing collapse, even if it means amending housing regulations or taking on more debt to support housing prices.³⁷ Thus, while the authors

³⁷ Fang, Gu, Xiong, and Zhou. “Demystifying the Chinese housing boom.” (2016).

observe a severe bubble in the Chinese property market, they argue it is unlikely to crash due to large political stakes in the sector.

A lot of literature and news on the condition of China's property market emphasize the worrisome nature of the rapidity of housing price growth in the past decade. However, Fang, Gu, Xiong, and Zhou (2016) views this growth in the context of household income. Based on the analysis of the price indices they constructed for 120 large Chinese cities, the authors argue that house prices are high but not on the verge of collapse because household income has also risen substantially over this period.³⁸ Fang, Gu, Xiong, and Zhou (2016) also reported price-to-income ratios of around eight in second-tier and third-tier cities, and ten or greater in first-tier cities. The flaw in this paper is that it assumes market prices and fundamental values are close in the beginning of the study period, so rapid price growth indicates a bubble because market prices increasingly deviate further from fundamental values over the course of the specified time frame. However, market prices and fundamental values are not necessarily close in the beginning period of the study.

Pritchett and Summers (2014) take a more macro perspective on the Chinese housing boom and use regression to the mean to assess the health of the Chinese economy and in effect the real estate market. Based on the theory of regression to the mean, the authors predict China's economic growth will slow significantly towards the mean country growth rate of two percent and a standard deviation of two percent. They use regression to the mean to analyze China's economy because historical data on country-level growth rates demonstrated that the theory is the single strongest and most empirically relevant fact about country-level growth rates. This conclusion bodes poorly for the Chinese economy because household expectations may collapse

³⁸ Ibid.

when China's GDP growth regresses to the mean. When expectations crash, house prices will as well, which would wipe out any potential profits to be made from future house price increases and likely leave Chinese homebuyers in massive debt.³⁹ While regression to the mean is a powerful economic measure, it similarly suffers from the problem of anchoring house prices to their fundamental values; however, this methodology provides interesting insight into the likelihood of a housing collapse in China based on analysis of past housing collapses in other countries.

This thesis therefore seeks to add to the existing literature on assessing the “bubbliness” of the current Chinese real estate market by using a fundamental analysis-driven approach, which acknowledges and accounts for the issue of anchoring prices to fundamental values. Data on matched pairs of homes in China (meaning two homes with similar characteristics such as location, size, year constructed, floor level, etc.) where one was rented out recently and one sold recently are used to examine whether home prices in China are above or below their fundamental values. While previous literature have used fundamental analysis to examine the Chinese property market, sales and rent price indices were used instead of individual matched pairs of homes sale and rental price data. Furthermore, this paper uses updated housing data from mid 2018 to early 2019.

³⁹ Lant Pritchett, and Lawrence H. Summers. “Asiaphoria meets regression to the mean.” No. w20573. *National Bureau of Economic Research* (2014).

Methodology

The methodology of this paper is modeled after Smith and Smith (2006) and their perspective on what constitutes a housing bubble. Most measures of real estate frothiness involve observing rapid price increases over a certain period⁴⁰; however, Smith and Smith suggest that high growth in property prices does not necessarily signify a bubble. Instead, rapid price growth could imply that fundamental values are growing quickly. Alternatively, it could imply market value of homes are significantly below fundamental values, and are therefore growing rapidly to converge with fundamental values. The fundamental value of a home can be found by calculating the present value of the expected future cash flows from owning the home, which is the rent one would otherwise have to pay, net of expenses of home ownership. Therefore, a bubble is defined as when the expected future cash flows do not justify the market prices of those homes. While Smith and Smith's findings did not predict the housing bubble, potentially due to underestimation of home ownership expenses and required rate of return as noted by Christopher Mayer, the underlying model is sound and helpful in gauging the fundamental values of housing prices.⁴¹

Many people use comps to find whether the price of a home is justified; however, comps only provide a snapshot of market prices people paid for in a given point in time, and fails to inform whether prices are justified by the cash flow. Smith and Smith argue that the use of comps is the "very mechanism by which market prices can wander far from fundamental values. If no one is estimating fundamental value, why should anyone assume that market prices will equal fundamental values?" Comps incorrectly assume that market prices are in line with

⁴⁰ Charles P. Kindleberger. "International Capital Movements." *Cambridge University Press* (1987).

⁴¹ Smith and Smith. "Bubble, bubble, where's the housing bubble?" (2006).

fundamental values, and are therefore a poor measure for deciding whether the price of a home is justified.

Furthermore, the use of housing price indices is oftentimes flawed because of its reliance on aggregation for analyzing home prices. Housing location and characteristics are distinct and sometimes not properly accounted for in price indices – for example, real value added from remodeling over time are sometimes mistakenly factored into price appreciation. For example, in major cities in the United States, property improvements can distort price index valuations by as much as 15 percent.⁴²

Even if house prices are aggregated correctly, commonly used ratio comparisons between house price and household income or house price and rental price can be faulty as well. While looking at price-income measures can provide insight into the affordability of homes in an area, affordability does not necessarily correlate with nor reveal the proximity from intrinsic values of homes. Smith and Smith backs this notion with a comparison to the Berkshire Hathaway stock, which currently trades at \$306,100 per share. Although the stock is not affordable for most people, it can very well be worth the price. Similarly, price-rent ratios are not the best for analyzing property bubbles because these ratios can fluctuate significantly with changes in interest rates or expected future changes in rent growth.⁴³

Using Smith and Smith's methodology, this paper attempts to analyze the fundamental values of homes in Beijing and Shanghai in the latter half of 2018 and early 2019 using home sales data for the market prices and actual rental data as the expected future cash flows. In addition to rental data, one must also consider other factors that affect the fundamental value of a

⁴² Alexander N. Bogin and William M. Doerner. "Property Renovations and Their Impact on House Price Index Construction." No. 17-02. *Federal Housing Finance Agency* (2017).

⁴³ Smith and Smith. "Bubble, bubble, where's the housing bubble?" (2006).

home, including transaction costs, down payment, maintenance costs, property taxes, mortgage payments, tax savings and capital gains. The fundamental value of a home can be evaluated by the net present value (NPV) of cash flows including the initial cost:

$$NPV = X_0 + \frac{X_1}{(1+R)^1} + \frac{X_2}{(1+R)^2} + \frac{X_3}{(1+R)^3} + \dots + \frac{X_n}{(1+R)^n}$$

X_0 is the initial down payment and closing costs. The subsequent cash flows represent the rent that the owner would have to otherwise pay if he or she were renting the place instead, minus the mortgage payment and other expenses relating to homeownership. R is the required rate of return, which depends on the returns from alternative investments. If NPV is negative, then renting a home is better than buying a home, which is an indicator that people are buying homes anticipating a rise in home prices and significant future capital gains rather than buying justified by expected rental savings in the long-term.⁴⁴ If NPV is positive, then buying a home is more worthwhile than renting, which indicates that home prices may be high but justified, and therefore not a bubble.

For this paper, a six percent required rate of return is assumed for the following reasons. First, the seven-day annualized yield has ranged from 2.3 percent to 4.8 percent in the last five years on some of China's largest money market funds such as Ant Financial Services Group's Tianhong Yu'e Bao fund and Tencent's LingQianTong fund.⁴⁴ For longer deposit periods such as one-month or three-month, the annualized yield is even higher. Given these interest rates, a four percent required rate of return on a money market fund for a medium term deposit period is reasonable. However, since housing investments are significantly less liquid and an enormous

⁴⁴ Stella Yifan Xie. "World's Largest Money Market Fund is Shrinking as It Battles Rival on Yields." *The Wall Street Journal* (2019).

capital commitment, a two percent risk premium is assumed like in Wu, Gyourko and Deng (2012); this implies a six percent total required rate of return for housing investments.

Data

The data come from 链家 (“Lianjia”), one of China’s largest real estate brokerage firms. There are two categories of data for the pair matched homes: past rental price data and past sale price data. All of the homes are residential apartment properties, and the data span from June 2018 to February 2019. The rental and sale price information include data on location, number of rooms, size, transaction date, price, asking price, direction, general floor level (low, middle, high), total number of floors in building, year built and days on market between initial posting and transaction closing.

This data can only be accessed on a mobile device through the company’s mobile app – it is not available to the public on a desktop or laptop. To find the data, the Lianjia website requires the user to input a Chinese cellphone number on its website login page. After inputting a Chinese cellphone number, a confirmation code is sent to the phone number. This confirmation code must then be inputted to the website login page. Once logged in, the both past home sales and rental transaction data can be found under the section title “查交易”, which translates to “check past transactions”. Filters on date of transaction, house size, location, etc. were applied to streamline the search. Each house sale transaction and rental transaction were then manually matched based on a number of criteria discussed below, and recorded in Microsoft Excel.

Table 1. Beijing Matched Pairs of Homes District Breakdown

Beijing		
	<i>Subdistricts</i>	<i>Matched Pairs</i>
Xicheng	16	67
Dongcheng	11	48
Haidian	21	182
Chaoyang	5	46
Shunyi	4	48
Tongzhou	1	13

Table 2. Shanghai Matched Pairs of Homes District Breakdown

Shanghai		
	<i>Subdistricts</i>	<i>Matched Pairs</i>
Pudong	4	58
Xuhui	4	55
Baoshan	8	139
Putuo	5	53
Yangpu	3	25
Minhang	2	40
Changning	1	22
Jiading	1	13

The data focus on China's two largest cities, Beijing and Shanghai. Within each city are 16 and 15 districts, respectively. Of these districts, I selected the primary districts in and surrounding the city center. For Beijing, the selected metropolitan areas are Xicheng, Dongcheng, Haidian, Chaoyang, Shunyi and Tongzhou. For Shanghai, they are Pudong, Xuhui, Baoshan, Putuo, Yangpu, Minhang, Changning and Jiading. Data collected for Beijing and Shanghai totaled 404 and 405 matched pairs of homes, respectively. The breakdown of the matched pairs in each city can be observed in Table 1 and Table 2.

Table 3. Physical Characteristics of Housing Sample Data in Beijing and Shanghai

Physical Characteristics of Housing Sample					
	<i>Median</i>	<i>Mean</i>	<i>Average number</i>	<i>Median</i>	<i>Mean</i>
	<i>price/SQM</i>	<i>price/SQM</i>	<i>of rooms</i>	<i>SQM</i>	<i>SQM</i>
Beijing	\$11,517	\$12,446	1.75	61.50	69.48
Shanghai	\$6,925	\$7,330	1.64	55.59	60.66

In selecting the matched pairs of homes, several conditions had to be met. Homes had to be within the same apartment complex, which largely reduces differences in building style, age and location. The buildings of the matched pair of apartments had to share approximately the same number of stories, and the apartments themselves had to share the same general floor level (low, middle or high). Matched apartments had to share the same number of bedrooms and bathrooms, and less than 10 percent differential in square meterage. Lastly, matched apartments had to share a common direction. There are a total of eight possible directions: north, northeast, east, southeast, south, southwest, west, and northwest.

Analysis

The constant assumptions made for the home valuation across both Beijing and Shanghai are as follows: 2 percent of sale price in initial closing costs, a 30-year mortgage, 6 percent required rate of return, 1.5 percent annual maintenance costs, 2 percent sales transaction cost, 20 percent capital gains tax rate and no annual federal property tax.⁴⁵

The down payment differs between first home purchase and second or more home purchases. For first home purchases, the down payment is 30 percent whereas for second or more home purchases, the down payment is 60 percent. Between Beijing and Shanghai, the mortgage rates differ as well. The mortgage rate in Beijing for a first home purchase versus a second or more home purchase is 5.5 percent and 6.0 percent, respectively. For Shanghai, the mortgage rates are 5.0 percent and 5.25 percent, respectively.⁴⁶

⁴⁵ "Real-Estate Agent Commissions Around the World." *The Wall Street Journal* (2015).

⁴⁶ *The People's Bank of China*.

Table 4. Beijing and Shanghai Housing Information on First Year Cash Flows

Table 4. Beijing & Shanghai Housing Data Analysis				
	Beijing		Shanghai	
First-year average annual rent	\$12,316		\$7,738	
First-year average price	\$777,202		\$438,033	
First-year average rent/price	1.63%		1.89%	
First-year average cash flow w/o mortgage	\$658		\$1,168	
First-year cash flow/price w/o mortgage	0.13%		0.39%	
	<u>1st home</u>	<u>2nd home</u>	<u>1st home</u>	<u>2nd home</u>
First-year average net cash flow	-\$36,410	-\$21,709	-\$18,585	-\$10,443
First-year net cash flow/price	-4.64%	-2.74%	-4.12%	-2.26%

A variety of assumptions for the annual price and rent growth rates as well as annual other expenses growth rate are used to account for the uncertainty of China's housing market in the future. While house price and rental price growth rates in China have historically been very high in the double digits, most of this growth is attributed to the relatively recent privatization of property, large country-wide urbanization and unprecedented economic growth. Because these factors have already largely had their effects on the housing market, property and rental price growth rates should and actually have already begun to slow down in the last few years. Additionally, the Chinese government has recently been enacting policies to cool and stabilize the property market, which is further restraining price growth going forward. Since fundamental home valuation helps determine whether a home is worthy of buying for the long-term, slower rental growth rates are assumed. The different price growth rate scenarios of five, three and two percent can be observed in Table 6 and Table 7.

Table 5. Consumer Price Index Growth Rate in China from 2006 to 2018

CPI Growth Rate in China	
<i>Year</i>	<i>Historic Annual Inflation</i>
2006	2.81%
2007	6.58%
2008	1.26%
2009	1.70%
2010	4.57%
2011	4.03%
2012	2.53%
2013	2.51%
2014	1.41%
2015	1.62%
2016	1.99%
2017	1.85%
2018	1.91%

Source: Inflation.eu

Furthermore, since the future of China's property market in regards to how house prices and rental prices will continue to fluctuate remains uncertain, the baseline assumption for price growth rates is two percent, the average annual inflation rate based on China's consumer price index (CPI). Over the last decade, average annual inflation rate was 2.41 percent, and over the last five years, 1.76 percent.

Table 6. Beijing Housing Data Analysis

Table 6. Beijing Housing Data Analysis (404 matched pairs of homes)						
	<i>1st home</i>	<i>2nd home</i>	<i>1st home</i>	<i>2nd home</i>	<i>1st home</i>	<i>2nd home</i>
House Purchase						
Down Payment	30%	60%	30%	60%	30%	60%
Closing Cost	2%	2%	2%	2%	2%	2%
Mortgage Rate	5.50%	6.00%	5.50%	6.00%	5.50%	6.00%
Mortgage Amortization (years)	30	30	30	30	30	30
<i>Annual Price Increase</i>	<i>5.00%</i>	<i>5.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>2.00%</i>	<i>2.00%</i>
Rent and Expenses						
Annual Rent Tax	0%	0%	0%	0%	0%	0%
Annual Maintenance	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
<i>Annual Rent Increase</i>	<i>5.00%</i>	<i>5.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>2.00%</i>	<i>2.00%</i>
<i>Annual Expenses Increase</i>	<i>3.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>2.00%</i>	<i>2.00%</i>
Required Return and Transaction Costs						
Sales Transaction Costs	2%	2%	2%	2%	2%	2%
Capital Gains Tax	20%	20%	20%	20%	20%	20%
Required After-Tax Return	6%	6%	6%	6%	6%	6%
Results						
Year that median IRR turns positive	5	2	20	8	Never	23
First year median IRR	-9.28%	-2.56%	-11.69%	-5.48%	-18.43%	-7.12%
10 year median IRR	2.18%	3.02%	-1.94%	0.29%	-4.52%	-1.05%
30 year median IRR	4.31%	4.38%	1.16%	1.68%	-0.34%	0.50%
Forever median IRR	5.89%	5.79%	<i>Undefined</i>	<i>Undefined</i>	<i>Undefined</i>	<i>Undefined</i>

**Note: Rate of annual price increase is not considered for the infinite holding period*

Table 6 shows the results for the 404 matched pairs of homes in Beijing. The first, third and fifth columns reflect the results for first home purchases and the second, fourth and sixth columns reflect the results for second or more home purchases.

Columns one and two show the results for five percent annual price and rental growth rates with three percent annual other expenses growth rate. Given these assumptions, the median IRR from purchasing a first home is negative for the first four years, and for a second home negative for the first year. The ten-year median IRR is 2.18 percent and 3.02 percent for the first and second home, respectively. Assuming an infinite horizon where the property is held indefinitely and therefore house price growth rate is not taken into account, the median IRR is 5.89 percent for the first home and 5.79 percent for the second home. Median NPV for a sixty-year time horizon is very negative for both first and second home purchases, at negative

1,415,154 RMB and negative 1,594,002 RMB, respectively. Even with an infinite horizon, the median NPVs for buying a first home and a second home in Beijing are negative 492,528 RMB and negative 665,724 RMB.

Columns three and four assume three percent annual price and rental growth rates with three percent annual other expenses growth rate. Under these assumptions, median IRR from purchasing a first home is negative for the first 19 years, and for a second home negative for the first seven years. The ten-year median IRR is negative 1.94 percent for the first home and barely positive at 0.29 percent for the second home. Assuming an infinite horizon where the property is held indefinitely, the median IRR for any number of home purchases is undefined because the value never turns positive. The median NPVs for both the sixty-year and infinite time horizon are very negative at around four million RMB for both the first and second home purchases. With slower house price and rental price growth rate assumptions, the NPV is much more negative, reflecting that people are buying homes speculating greater price growth rather than buying because it is more worthwhile than renting.

Columns five and six use two percent annual price and rental growth rates with two percent annual other expenses growth rate. Given these assumptions, the IRR from purchasing a first home never turns positive, and for a second home negative for the first 22 years. The ten-year median IRR is negative 4.52 percent and negative 1.05 percent for the first and second home, respectively. Assuming an infinite horizon where the property is held indefinitely, the median IRR for any number of home purchases is also undefined since the value is negative. Like the three percent price growth rates assumption, median NPV for a sixty-year time horizon is also very negative, at negative 4,221,558 RMB for the first home and negative 4,397,705 RMB for the second. Assuming a holding period of forever, the median net present values for

buying a first home and a second home in Beijing are negative 4,509,747 RMB and negative 4,676,943 RMB, respectively.

Table 7. Shanghai Housing Data Analysis

Table 7. Shanghai Housing Data Analysis (405 matched pairs of homes)						
	<i>1st home</i>	<i>2nd home</i>	<i>1st home</i>	<i>2nd home</i>	<i>1st home</i>	<i>2nd home</i>
House Purchase						
Down Payment	30%	60%	30%	60%	30%	60%
Closing Cost	2%	2%	2%	2%	2%	2%
Mortgage Rate	5.00%	5.25%	5.00%	5.25%	5.00%	5.25%
Mortgage Amortization (years)	30	30	30	30	30	30
<i>Annual Price Increase</i>	<i>5.00%</i>	<i>5.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>2.00%</i>	<i>2.00%</i>
Rent and Expenses						
Annual Rent Tax	0%	0%	0%	0%	0%	0%
Annual Maintenance	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
<i>Annual Rent Increase</i>	<i>5.00%</i>	<i>5.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>2.00%</i>	<i>2.00%</i>
<i>Annual Expenses Increase</i>	<i>3.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>3.00%</i>	<i>2.00%</i>	<i>2.00%</i>
Required Return and Transaction Costs						
Sales Transaction Costs	2%	2%	2%	2%	2%	2%
Capital Gains Tax	20%	20%	20%	20%	20%	20%
Required After-Tax Return	6%	6%	6%	6%	6%	6%
Results						
Year that median IRR turns positive	4	2	15	5	28	13
First year median IRR	-7.44%	-1.68%	-13.20%	-4.58%	-16.50%	-6.22%
10 year median IRR	3.27%	3.72%	-0.92%	1.05%	-3.17%	-0.26%
30 year median IRR	4.87%	4.84%	1.70%	2.17%	0.27%	1.02%
Forever median IRR	6.09%	6.09%	3.16%	3.16%	2.18%	2.18%

**Note: Rate of annual price increase is not considered for the infinite holding period*

Table 7 reflects the housing analysis for the 405 matched pairs of homes in Shanghai. Compared to home prices in Beijing, Shanghai house prices are closer to fundamental values based on the NPV approach, but still frothy. Like Beijing, the Shanghai results use the same assumptions of five, three and two percent annual house price and rental price growth rates with corresponding three, three and two percent growth rates for annual other expenses.

Under the assumption of five percent annual price and rental growth rates with three percent annual other expenses growth, the median IRR from purchasing a first home is negative for the first three years, and for a second home negative for the first year. The ten-year median

IRR is 3.27 percent and 3.72 percent for the first and second home, respectively. Assuming an infinite horizon where house price growth rate is not considered, the median IRR is 6.09 percent for both the first and second or more homes, just marginally higher than the assumed six percent expected rate of return. This means that the median NPVs for buying a first home and a second home in Shanghai are positive, at 437,782 RMB and 310,726 RMB, respectively, assuming a holding period of forever. However, while median NPV for whatever number of home purchases is positive, it is only slightly positive as reflected in the median IRR which is barely above the expected rate of return. Therefore, these results can be interpreted as essentially a breakeven investment. Any small changes in other inputs and assumptions can result in a more significantly positive NPV or negative NPV. Take a sixty-year time horizon, which is about 80% of the average Chinese person's entire lifespan, median NPV is negative 447,672 RMB and negative 560,839 RMB for the first and second homes, respectively.

Using three percent annual price, rental and other expenses growth rates, median IRR from the first home purchase is negative for the first 14 years, and for a second home negative for the first four years. The ten-year median IRR is negative 0.92 percent for the first home and positive 1.05 percent for the second home. Assuming an infinite horizon where the property is held indefinitely, the median IRR is 3.16 percent for the first home and 3.16 percent for the second home. The median NPV for the sixty-year investment horizon for the first home is negative 1.96 million RMB and 100,000 RMB more negative for the second home. For an infinite time horizon, the median NPVs are negative 2.28 million for the first and similarly 100,000 RMB more negative for the second.

The last assumption of two percent annual price and rental growth rates with two percent annual other expenses growth rate finds that median IRR from a first home purchase remains

negative for the 27 years, and for a second home negative for the first 12 years. The ten-year median IRR is negative 3.17 percent and negative 0.26 percent for the first and second home, respectively. Assuming the property is held forever, the median IRR is 2.18 percent for both the first and second homes. The median NPVs for the sixty-year and infinite investment horizon are very negative, between two to 2.5 million for the first and second or more home purchases. While Shanghai home NPVs are very negative, Beijing home NPVs are far more negative at nearly twice the value of Shanghai homes.

Given these results, Beijing's property prices and Shanghai's property prices are both very bubbly, with the exception of nearly breakeven median NPVs for Shanghai homes under the assumptions of five percent annual price and rental growth rates with a three percent annual other expenses growth rate. Even with an infinite investment horizon, home prices, assuming closer to CPI inflation rates of two to three percent price growth rates, are far above fundamental values. This indicates that people are purchasing homes at current price levels despite the financially more sound decision to rent because they are anticipating continued high house price growth and significant capital gains.

Discussion

The results from this analysis confirm largely what previous literature have concluded – that the major Chinese housing markets of Beijing and Shanghai appear to be in a bubble, where market prices are significantly above fundamental values. Given China's government incentive structures and nascent financial system, these findings do not come as much of a surprise. Since these results reinforce the perspective that Beijing and Shanghai are in a housing bubble, it is

crucial to understand the consequences of a potential housing bubble collapse, even though many may argue that China's real estate sector is too important to fall.

Cracks have already appeared in parts of the Chinese housing sector, as evidenced by the widely reported ghost cities throughout the country. Continued wasteful construction by Chinese local governments could exacerbate the situation of ghost cities. If the Chinese economy slows significantly and household incomes drop, demand for housing, especially in smaller cities, will decline and lead to more cases of ghost cities. Furthermore, if household incomes drop, Chinese homeowners' mortgage payments will become much more burdensome, as price-to-income ratios in these major Chinese cities are already very high. In the scenario that a major price correction occurs, local government financing ability will also be adversely impacted, which in turn further impairs economic growth. Additionally, if the housing sector becomes a less attractive form of investment, capital outflows may occur as investors consider foreign investment opportunities, especially as China embraces economic liberalization.⁴⁷ Due to the sheer size of the Chinese economy and especially interconnected nature of the economy, government and real estate sector, a housing price correction can set off a vicious cycle culminating in a major economic downturn like the 2007-2008 financial crisis.

Although the possible consequences of a housing crash in China are frightening and likely to reverberate throughout the world, it is important to note that this is a worst case scenario. While rapid house price increases and the observed bubble characteristics demonstrated by fundamental analysis are understandably worrying, this does not capture the entire China picture – China is still a developing country with a nascent housing market and a recently liberalized financial market. In the development stage, there is greater volatility in markets and a

⁴⁷ Ding Ding, Xiaoyu Huang, Tao Jin, and W. Raphael Lam. "The residential real estate market in China: Assessment and policy implications." *Annals of Economics and Finance* 18, no. 2 (2017).

lot can go wrong; however, greater volatility and uncertainty (compared to in developed countries) are natural in this stage because markets have yet to stabilize. Thus, while the data findings of this thesis provide useful insight into how bubbly the Beijing and Shanghai housing markets currently are, one weakness of this approach is that property regulatory changes can alter the fundamental value of homes. Since the Chinese housing market is still evolving, the Chinese government will continue to tinker with different housing regulations in an attempt to develop and stabilize the market, as they have done so in the recent past. Examples of recent housing regulatory changes include the recent hikes in down payment requirement rates, as well as the Shanghai and Chongqing pilot property tax schemes introduced in 2011 on certain types of properties.^{48,49} Thus, while the results found in the above data analysis section provides helpful information on the degree of market frothiness currently in the Beijing and Shanghai housing markets, it is crucial to bear in mind that future regulatory changes, such as a nationwide rollout of annual property taxes, may have on housing fundamentals.

Conclusion

The Chinese housing market has been of international concern since the early 2000s, as housing prices have grown precipitously alongside a robust economy. The main causes that fueled the housing boom on the demand-side for housing include the privatization of housing in the late 1990s, a robust and urbanizing economy, lack of alternative investment opportunities, a strong culture of homeownership and strict housing regulations. On the supply-side of housing,

⁴⁸ Chen, Yawen, and Kevin Yao. "China tightens control on down payment financing for home buyers: Xinhua." *Thomson Reuters* (2017).

⁴⁹ "Update 1 – China's property tax will be implemented according to the city-lawmaker." *Thomson Reuters* (2019).

the main drivers were local governments' push for land sales and their strategic selling of land leading to significant land value appreciation. In chapter three, the paper examines previous literature for the various methodologies used to determine the existence of a housing bubble, and delves into the fundamental analysis method presented by Smith and Smith (2006), which serves as the underlying model for this thesis. Chapter four then uses the matched pairs of home price data in Beijing and Shanghai to analyze the current state of the two housing markets. The findings reveal that both cities are bubbly, and specifically Beijing more so than Shanghai with current housing prices. Given the existence of bubbles in these two major cities based on the fundamental analysis, potential ramifications of a Chinese housing bubble collapse are explored in the discussion section.

Future directions of research would include delving into how closely the real estate sector is tied to China's shadow banking sector, which has similarly seen an explosion in growth in recent years. As housing prices and household debt, particularly mortgage debt, has risen substantially, it would be interesting to examine how large a role shadow banking plays in facilitating mortgage lending. While lending standards are stricter in China than they were in the U.S. preceding the housing bubble burst in 2008, it is less clear if the same lending standards apply with shadow banks in China.

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