

The Great Chinese Bubble: Justifying the high and rapidly rising prices of residential housing values in China

Are China's housing prices misaligned with the fundamentals of supply and demand?

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Contents

| | |
|--|----|
| Purpose and Significance of Paper..... | 3 |
| Major Housing Reforms | 5 |
| Setting the Private Residential Real Estate Sector in Motion | 5 |
| Land market Better Regulated..... | 5 |
| Property Rights Better protected | 5 |
| Current Status of Chinese Property Market | 5 |
| Residential Property Market Segmentation | 5 |
| Policy Intervention..... | 6 |
| Rising Income Level and High Savings Rate | 7 |
| High Homeownership Rate | 8 |
| Leverage in the System | 9 |
| Just what is a Bubble? | 10 |
| So, Is There a Bubble? | 12 |
| Escalating Land Prices | 12 |
| Urbanization remains a key driver of demand | 14 |
| Determining the supply curve: Flat or Steep? | 15 |
| Methodology..... | 16 |
| Nation-Wide Data | 17 |
| City-level Data | 21 |
| Conclusions | 26 |
| Bibliography | 28 |

Purpose and Significance of Paper

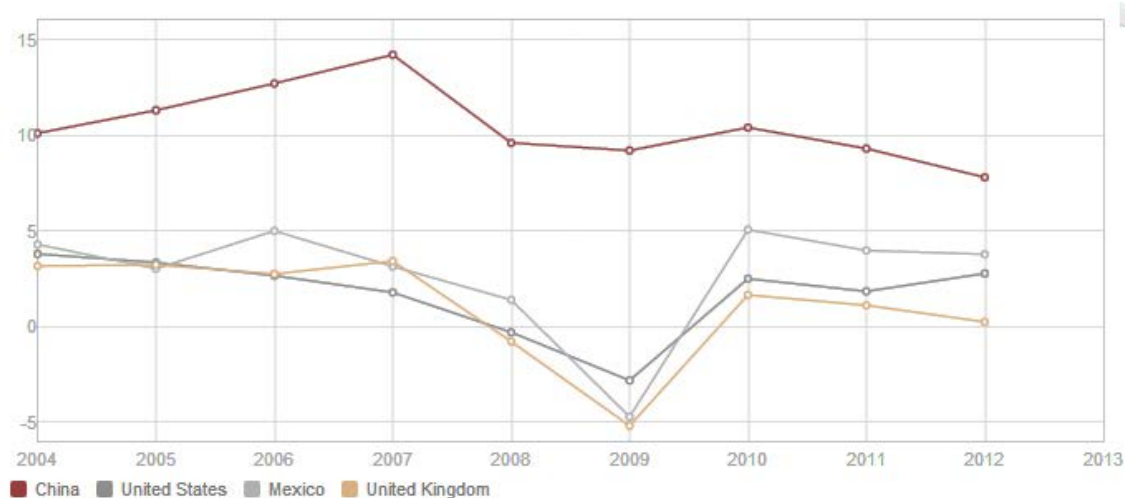
The purpose of this paper is to examine whether China's decade of rapid growth in home prices represents a gigantic housing bubble. The United States Housing meltdown in 2006-07 triggered a financial crisis that progressed into the worst recession since the Great Depression. Six years later, the United States is still recovering from the impact, and home prices have just begun to reach pre-crisis levels. There are still millions of "shadow" inventory- underwater mortgages, modified mortgages, and delinquent mortgages- in the markets. As of January 2014, CoreLogic estimates that there are 2.47 million loans that are 90 days or more past due or already in foreclosure (CoreLogic, 2014). While this is the lowest level since 2008 and 23% below 2013 levels, it will take time for the market to fully absorb this shadow supply (CoreLogic, 2014).

In contrast, China withstood the turmoil with a \$586 billion economic stimulus package in 2008 invested in housing, infrastructure, transportation, disaster rebuilding, tax cuts, and finance. The stimulus package was welcomed by world leaders who believed that by boosting the Chinese economy, China would simultaneously help stabilize the world economy. Upon announcement of the fiscal stimulus, markets around the world jumped. However, more recently there have been concerns that Chinese banks have loosened their lending standards as a result of the stimulus, which could lead to excessive lending to home purchasers and even more rapidly rising prices. These loosened lending standards may lead to an increase in nonperforming loans. If the unjustified high prices collapse, would the Chinese government also perform a bailout, similar to the Emergency Economic Stabilization Act of 2008? Through this act, the United States government had authorized the U.S. Treasury to buy risky and nonperforming debt from various lending institution and infused \$250 billion into the American banking system (US Federal Government). Despite concerns of the Chinese facing similar risks that pre-recession America faced, the likelihood of this happening is low, mainly due to the high equity levels that the Chinese tend to put into their homes relative to the rest of the world. There is an equity buffer in the Chinese market to withstand a drop in prices. It is unlikely that the Chinese government will allow prices to drop so much that it eats into the equity before implementing measures, as seen by the two decades of effective housing policy measures.

Perhaps what is much more concerning is the fact that residential investment accounts for 1/6th of China's economic growth (World Bank). China's GDP growth is already slowest in the past two decades. The direct and indirect effects on the economy outside of the banking system would be tremendous. While China continues to be the world's largest exporter, China's government is attempting to move the country away from reliance on state-led industry and exports toward larger domestic consumption, especially as the rising wages and appreciating Renminbi have been hindering the

nation's export growth (Silk, 2014). With the majority of the Chinese people's money invested in real estate, even if there is enough equity in the Chinese mortgage loans, the bursting of a housing bubble would significantly impact Chinese people's internal consumption power and slow down the economy even further. A significant slowdown in China, being the second largest global economy and a prime driver of the world economy, could trigger a downward spiral for the rest of the world.

Percentage GDP Growth of China and other countries



Source: World Bank

Therefore, the crucial issue is whether there are housing bubbles in major cities throughout the country that are about to burst. China has experienced extraordinary growth in the housing market during the past decade, which has been accompanied by substantial increases in residential property prices. As a result, owning a home has become increasingly less affordable for most working families, despite government's efforts in implementing policies and programs that support homeownership. The government has imposed a long string of housing policy measures to slow home price increase, aiming to curb property speculation and improve affordability. While these policies have been effective to a certain extent, prices only seem to be temporarily suppressed. Furthermore, another thing of concern would be the rent levels in these cities. Rents can be an indicator of a bubble, and rents in China have not grown nearly as quickly as sales have. In fact, in Beijing and Shanghai, rent levels are well below 2008 levels (Fung, 2014).

Major Housing Reforms

Setting the Private Residential Real Estate Sector in Motion

From founding of People's Republic of China to 1978, all land was publicly owned. There was a welfare system in place, in which government provided low-cost but also low-quality accommodations. In 1988, the Chinese Constitution was amended to allow land transactions. In March 1998, the Communist party announced new system to encourage people to purchase their homes, using one-time subsidies and mortgage incentives. In 1994, the government implemented a rent reform, allowed the sales of public housing, introducing concepts of “economically affordable houses” and “commodity houses”. In August 1999, it was declared that any residential unit built after January 1, 1999 was to be bought, not allocated by the government. After the housing reform, the land market was better regulated and property rights better protected. (McKinsey Global Institute, 2009)

Land market Better Regulated

China took major steps to improve regulation of its land market through the 1) abolition of private transfer of land titles after August 2004 and 2) requirements that all sites sold by local governments must through a public listing process with transaction prices disclosed. The introduction of the new rule provided better transparency. (Li, 2013)

Property Rights Better protected

To protect the legal rights of owners, the National People's Congress voted in August 1007 to add a new clause to the General Principles of the Law on Management of Urban Real Estate. The clause aims to protect the legal rights of owners and to guarantee the residence conditions of private owners after resettlement. The clause allows residential land use right scan to be automatically renewed upon expiration. (Li, 2013)

Current Status of Chinese Property Market

Residential Property Market Segmentation

These are the main types of residential properties in China. Developers mainly focus on the upper segments of the market.

1) Commodity Houses/ Private Housing

Commodity houses are purchased and rented at market prices. In 2010, municipal governments limited purchase of homes by non-residents to curtail speculation. There are concerns that this may lead to distortion of prices. This is the main focus for property developers. Property titles are transferable. Private housing segment has been gaining market share, accounting for 35% of total supply in 2012 (Li, 2013).

2) Economic Housing

Economically affordable houses are set by the government to be at no more than 3 - 5% above total construction costs (China Index Institute, 2012). To qualify, households must have “hukou” and other requirements. Once purchased, cannot be sold for another 5 years. The market share of economically affordable houses has been declining sharply (See graph below). Priced at 50-70% discount below private housing prices, these used to be built by state-owned real estate enterprises, targeted at Middle-income families with residency (Li, 2013). These properties are re-saleable after 5 years.

3) Low-rent Housing

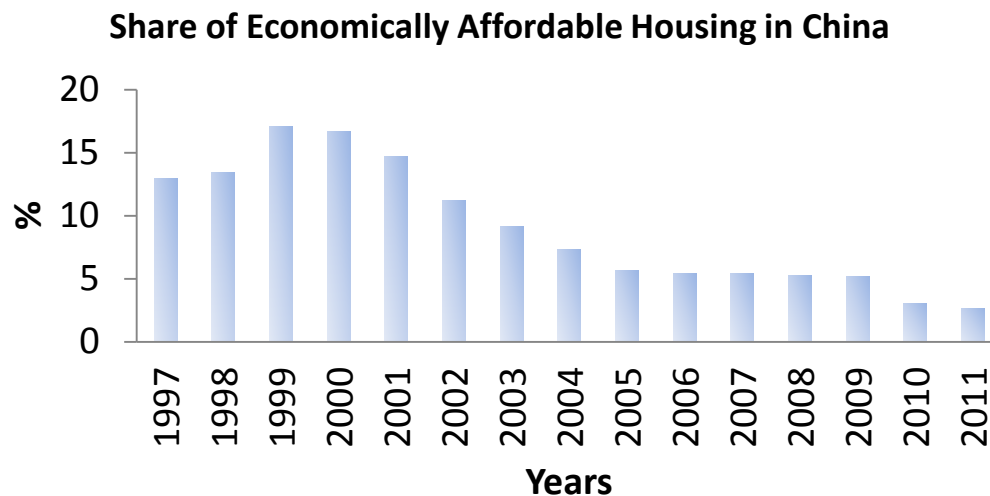
Initially built by the government, these are meant for low-income families that cannot afford a house. Units are allotted to families and are non-tradable.

4) Public Rental Housing

Newly introduced in 2007-08, public rental housing units is targeted at the population working in the major cities but do not have residency (hukou). These are also meant for families with income constraints but not eligible to apply for economic and low-rent housing.

5) Shanty-town Resettlement

Started in 2007 for the resettlement needs of shanty-town occupants. These are not re-saleable.



Source: China National Bureau of Statistics

Policy Intervention

Policy intervention by the Chinese government dates as far back as 2003. The industry was highly under-regulated prior to these policies. Demand side tightening measures are more common adopted, because the Central government has limited control over housing supply due to the highly fragmented nature of industry. After the 2008 financial crisis, the government implemented monetary easing such as mortgage rate cuts, and incentives were provided by local governments for home purchases, such as with ranting of residency status in cities.

Supply-side restrictive measures

- Breaking down large sites into smaller sites during land sale to increase asset turnover and completion
- Idle Land Policy (confiscating land set idle for over two years)
- Land Appreciation Tax
- Development of affordable homes
- Increasing supply of small units

Demand-side restrictive measures

- Increasing deed tax on luxury properties
- Forbidding resale of units before completion
- Capital Gain Tax on resale of units within two – five years of purchase
- Price caps on primary construction launches
- Real Estate Tax in Shanghai and Chongqing
- House Purchase Restrictions

Credit measures targeting at real estate

- Project LTV limited at 65%
- LTV limit of residential mortgages across first, second, and third –time home buyers

Rising Income Level and High Savings Rate

Two main factors make the Chinese consumer market stand out: 1) a rapidly rising per capita income level and 2) a high savings rate. According to Boston Consulting Group, China continues to have the highest percentage increase in assets under management, at 36.8%, boosted by strong economic growth and appreciation of Renminbi. Per-capita disposable income and population of middle class expected to continue to increase, though at a slower pace. (Milken Institute) Chinese households own about \$3.2 trillion in financial wealth, which is approximately 44% of the wealth of Asia-Pacific excluding Japan. Additionally, 64% of the assets are cash holdings. (Xu L. J., 2012)

National savings rate are important for the long-run health of economies. China has a National Savings Rate savings rate of 49.5% of GDP, which is ranked top 5 in the world and first amongst commodity-importing countries. This high savings rate can help the nation withstand a deterioration in global financing conditions. (Bank of America Private Wealth Management, 2012)

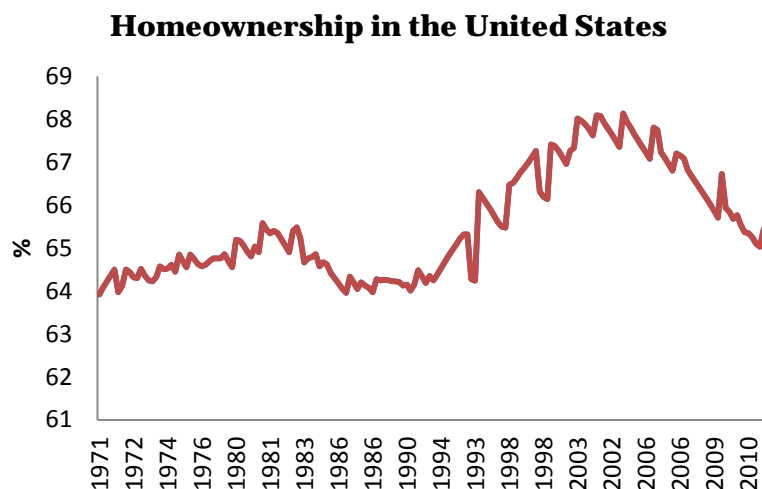
National savers: The Top 10 Highest Savings Rates Countries in 2012

| Rank | Country | National Savings Rate (% of GDP) |
|------|--------------|----------------------------------|
| 1 | Kuwait | 62.2 |
| 2 | Qatar | 55.4 |
| 3 | Libya | 52.4 |
| 4 | Saudi Arabia | 51.0 |
| 5 | China | 49.5 |
| 6 | Singapore | 45.6 |
| 7 | Oman | 44.6 |
| 8 | Gabon | 43.9 |
| 9 | Azerbaijan | 43.2 |
| 10 | Algeria | 42.4 |

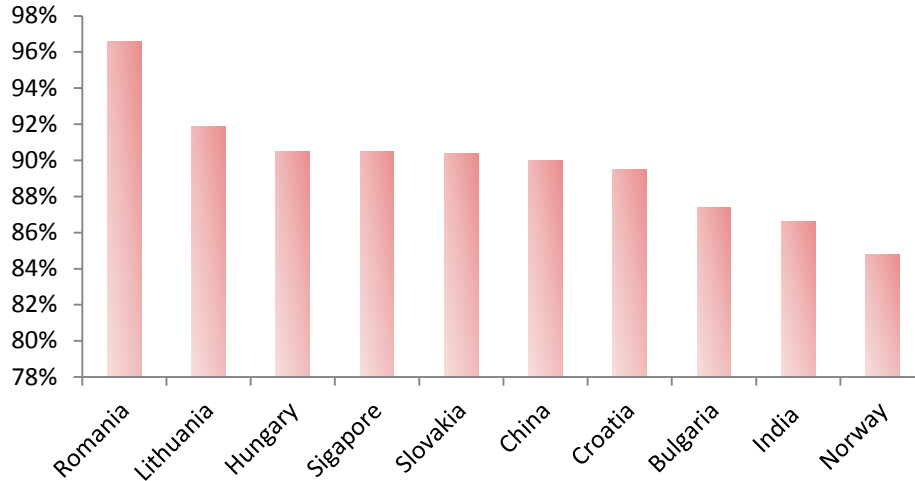
Source: International Monetary Fund as of April 2013

High Homeownership Rate

As a result, homeownership rate is very high in China. Homeownership was at 90% in 2012, which is 6th highest in the world. This can be compared to the United States homeownership rate, which has been fluctuating around 65%. It is believed that the high homeownership rate of the Chinese is due to a mix of cultural influences and limited investing opportunities for the Chinese. The Chinese government limits the amount of Chinese money invested abroad, and the Chinese stock markets are high in volatility. As the Chinese citizens' net wealth grew exponentially in the past decade, many Chinese view investing in real estate as the single most safe and feasible way to invest their money.



Top Homeownership Rates in the World

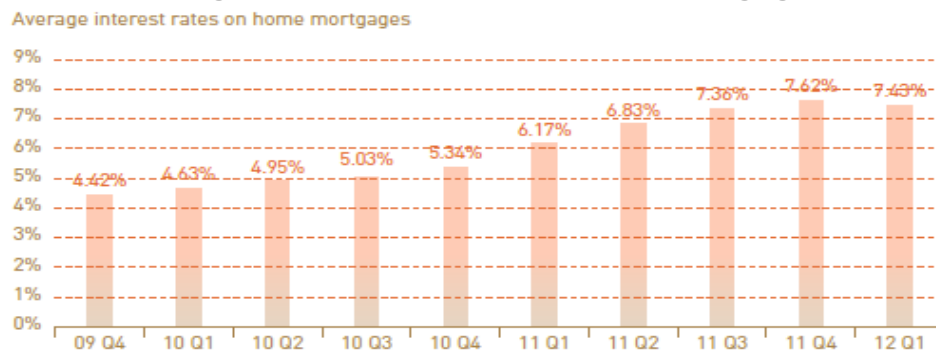


Source: Barclay's Research, Xinhua English News

Leverage in the System

In terms of financing of homes, Chinese homeowners take on very low leverage. Even without taking into consideration housing price growth, the Loan-to-Value (LTV) ratio is extremely low when compared to other nations. The average LTV ratio is around 21 - 30%. It is believed that the low leverage levels is due to the high savings rate of the nation (49.5% of GDP) and ceilings put on LTVs by the Housing Provident Fund. Additionally, most home loans in China are variable-rate mortgages, which can be concerning especially with the mortgage rates on the rise. The Chinese housing finance system is mainly comprised of **1) the Housing Provident Fund lending**, and **2) private sector mortgage lending**.

Average Interest Rates on Home Mortgages



Source: Standard Chartered bank (2013)

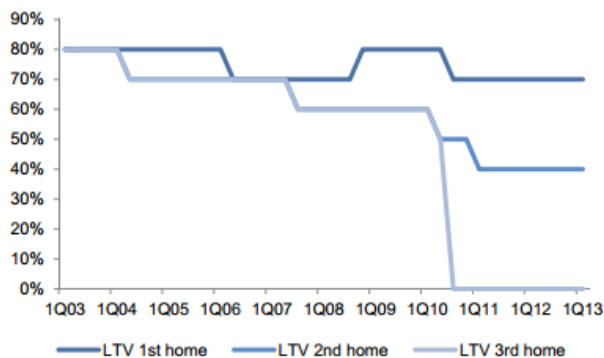
1) Housing Provident Fund (住房工資金)

The Chinese has a system called the Housing Provident Fund (HPF) in place to curfew the amount of debt one can take on. The HPF is a defined contribution pension, of which contribution come from both employers and employees. Monthly contribution from both sides should be at least 5% of the employees' monthly salary, and capped at 20%. Each city has its own HPF Management center. Additionally, the max loan amount is Rmb 0.4 mn for individual and Rmb 0.8 mn for a household. The allowable loan amount is set at 15 – 25x HPF account amount. The max LTV for small unit (<90 square meters) is 80%, and the max LTV for a larger unit larger unit (>90 square meters) is 70%. (Housing Finance Network, 2013)

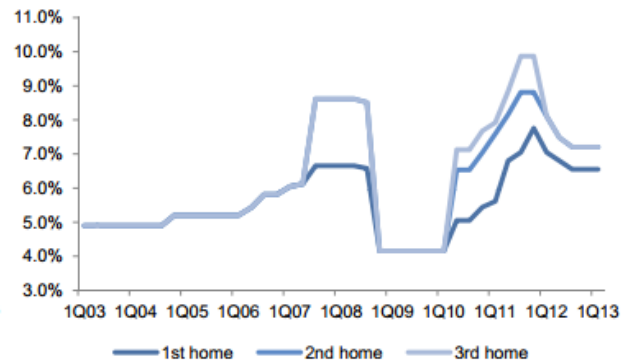
2) Private Sector Mortgage

Private sector is the main source of home finance, accounting for 82% of total home mortgages last year (Li, 2013). China's private sector mortgage grew 173 times since 1998, now the second largest Asia-Pacific market (US \$1.16 trillion) after Japan (US \$1.29 trillion) (Housing Finance Network, 2013).

China Mortgage Loan LTV Limits



China Mortgage Loan Rates



Source: PBoC, J.P. Morgan Equity Research

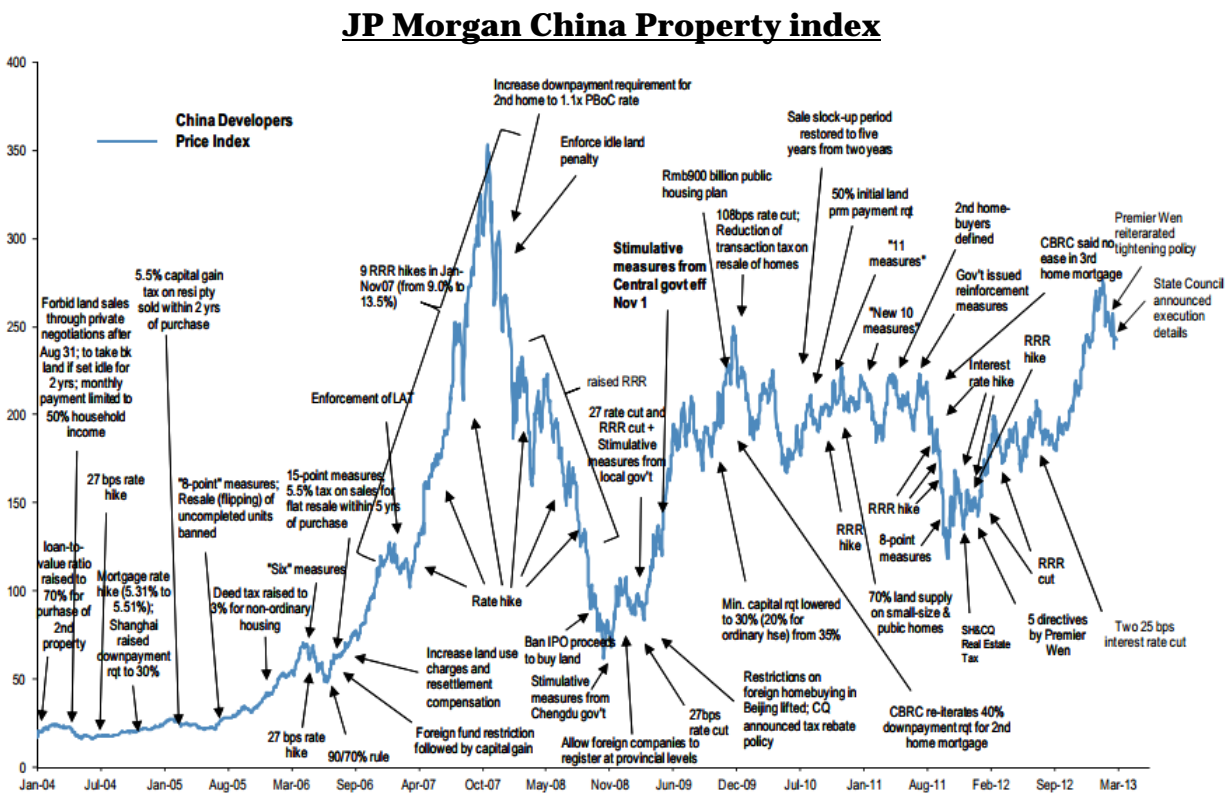
Just what is a Bubble?

Asset bubbles have been the cause of many economic recessions, but is there a way to empirically spot the bubble before it bursts? In New York Times, Yale economist Robert Shiller listed factors giving rise to a bubble. He argued that a bubble is a form of "psychological malfunction", and below is a checklist to determine if there is an asset bubble. (Shiller, 2010)

- 1) Sharp increases in the price of an asset
- 2) Great public excitement about said increases
- 3) An accompanying media frenzy
- 4) Stories of people earning a lot of money, causing envy among people who aren't
- 5) Growing interest in the asset class among the general public

- 6) "New era" theories justify unprecedented price increases
- 7) A decline in lending standards

All of the above have been seen in China's major cities. Determinants of Home prices include fundamentals of housing supply and demand (Glindro et al., 2005). Another factor (which arguably can be categorized as a fundamental) is government support and policies (Huang, 2004). As seen from the graph below from JP Morgan Asia Research, China's property market represents a highly regulated industry, and the government has significant impact on the property index. Similarly, Xu and Chen found in a paper published in 2010 that monetary policy clearly accelerated home price growth, while speculative investment inflow did not have a significant impact on home price growth after controlling for money supply growth (Xu and Chen, 2010).



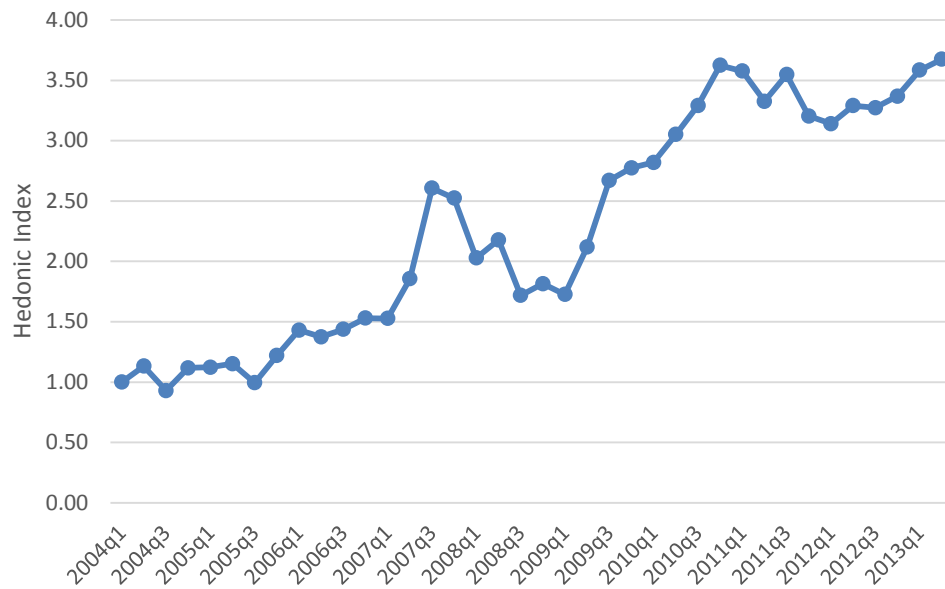
So, Is There a Bubble?

The possibility of a real estate bubble in China is hardly a trivial matter, and much research have already been done. There are mixed results from papers written so far on this issue. Most agree that there is a higher chance of a bubble existing in mega-metropolitan cities such as Beijing and Shanghai. Ahuja and colleagues in 2010 found that there is lack of evidence of a nationwide housing bubble, but some studies find overpricing may exist in mega-metropolitan areas such as Beijing, Shanghai, and Chongqing (Ahuja et al, 2010). In a paper by Wu, Gyourko, and Deng in 2010, it was stated that “although we could not provide a definitive test with our limited data...multiple parts of evidence...suggest the potential for substantial mispricing in Beijing and other Chinese housing markets...The magnitude of the increase in land values over the past 2 – 3 years in particular in Beijing is unprecedented to our knowledge” (Wu, Gyourko, & Deng, 2010). In 2011, Wall Street Journal published an article titled “The Great Property Bubble of China May Be Popping”, suggesting that after years of housing prices gone wild, prices are finally heading downwards (Davis, 2011). World Bank economists warned in press conferences that a downturn in property prices was among the biggest economic risks that China faces. While there was a slowdown in the property markets in 2010-2011, especially due to government’s efforts to rein in rising residential property prices and create a soft landing, such was with abovementioned demand and supply restraints. However, prices have only continued escalating upwards since 2011.

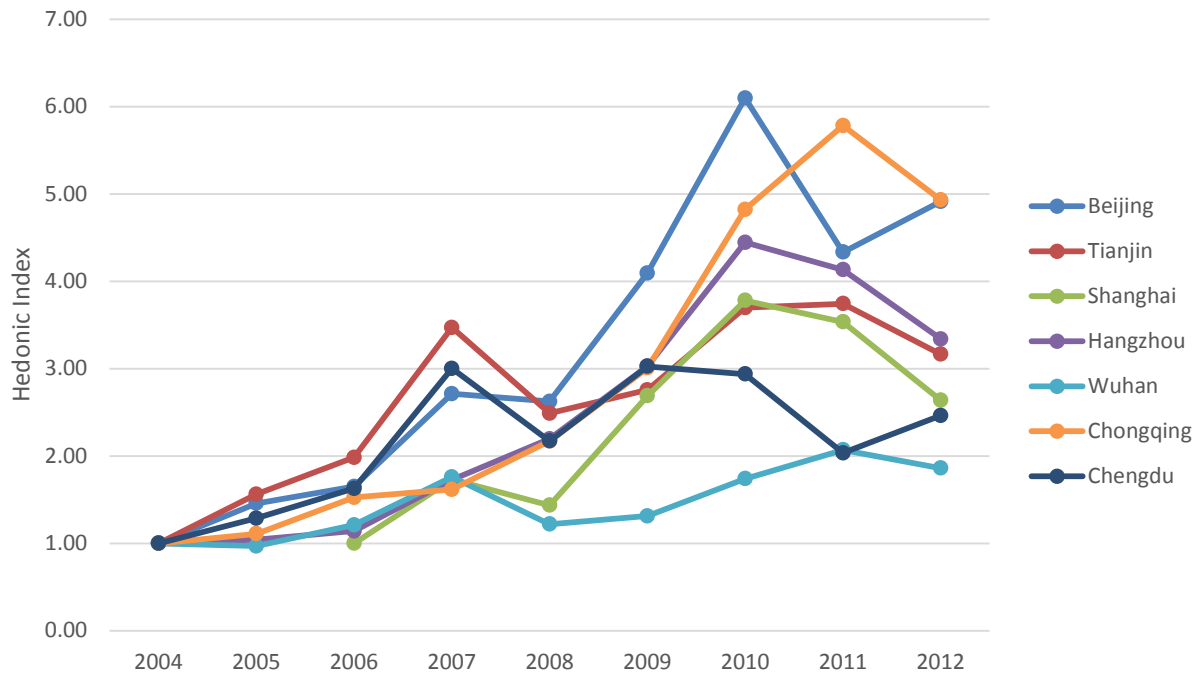
Escalating Land Prices

China’s official data from the National Bureau of Statistics website is haunted by controversy, with widespread doubts about its accuracy. For example, independent estimates of China’s GDP growth suggest that the official data might be exaggerated. But the one thing we can be certain of are the escalating land prices in China (Orlik, 2011). The government introduced in 2004 that all sites sold by local governments must go through a public listing process, enabling researchers to obtain public data on land prices. The Chinese National hedonic Land Price Index (CRLPI), an index developed by Joseph Gyourko, Jing Wu, and Yongheng Deng in 2012, tracks the real land prices of 35 city markets in China. Since the first quarter of 2004, real land prices have increased by approximately 200%. There was prices surge just before the recession and dropped during the global financial crisis. Prices quickly picked up after the 2008 stimulus was implemented. This price escalation continued until 2011 when the stimulus came off as the government once again worry about the overpriced property values and affordability of homes. Similarly for city-wide data, we see the common trend of rapidly rising land prices in each city.

Chinese National Hedonic Land Price Index
(35 Markets)



Chinese City-level Hedonic Land Price Index

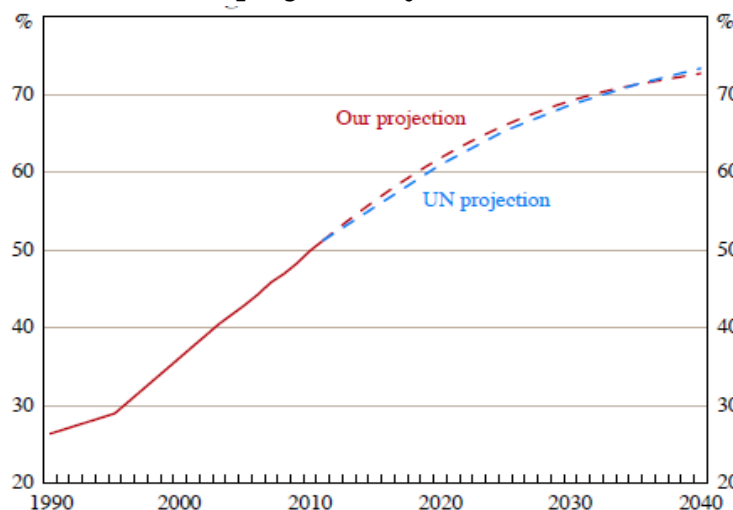


Source: Wharton/NUS/Tsinghua Chinese Residential Land Price Indexes (CRLPI)

Urbanization remains a key driver of demand

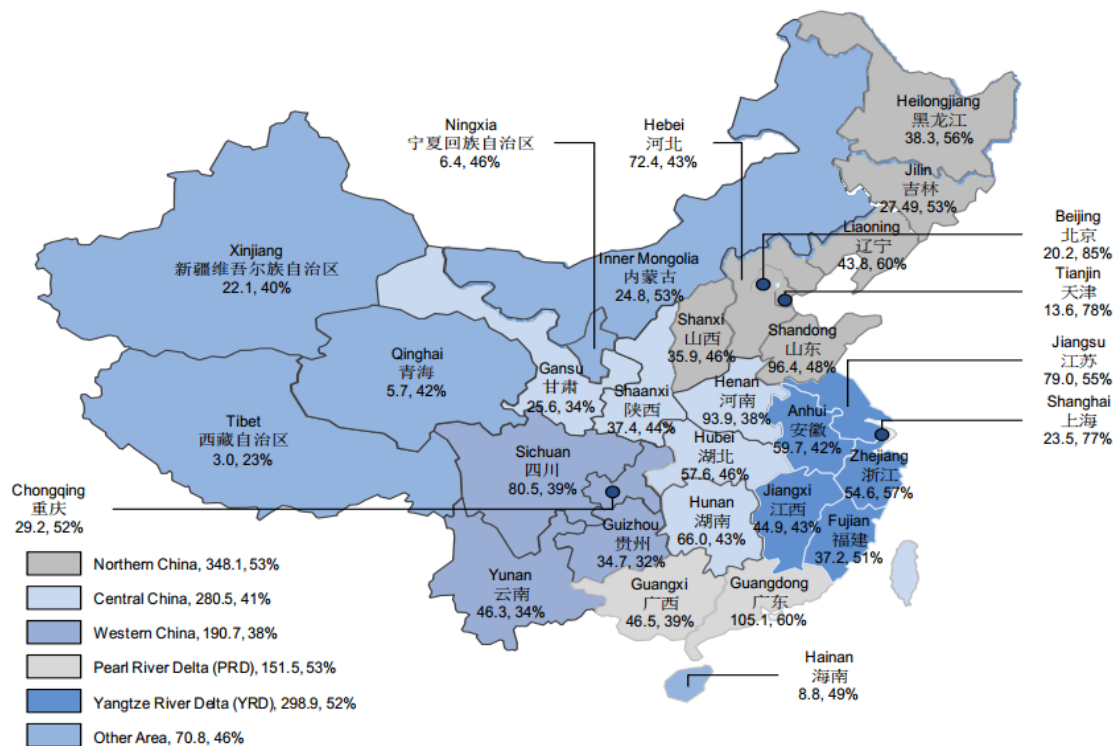
What is the cause of the escalating prices? The abovementioned high homeownership rate, high savings rate, and high income growth are all factors. Arguably the most important factor in the rapidly rising prices of homes is urbanization, which is the main demand driver for residential houses. Demand curve is very clearly shifting outwards due to urbanization and strong economic fundamentals. In fact, urban population of China is expected to increase by 26% over the next decade (Economic Intelligence Unit). This is caused by burgeoning economic success and rapidly rising standard of living. In 2011, China's urban population has already exceeded 50 % of its total population for the first time, meaning that over half of China now lives in major cities. In fact, McKinsey Global Institute found that if current trend holds, nearly 1 billion people will live in urban centers by 2025. As seen in the graph below by the Reserve Bank of Australia, urbanization rate is predicted to reach 75% of total Chinese population by 2040.

Urbanization Rate, projected by Reserve Bank of Australia



Source: United Nations, Reserve Bank of Australia

China Map: Population Size and Urbanization Rate by Provinces and Municipalities



Source: JP Morgan Asia Pacific Research

Determining the supply curve: Flat or Steep?

Now that we've established with evidence the escalating prices and high demand of the Chinese property market, the shape of the supply curve in China can help determine whether there is a housing bubble in China's major cities. To justify the prices, we would hope that the supply curve slopes upwards instead of laying flat. There was a total of 3.4 billion square meter of floor space built in China in 2012 (CEIC). Arguably, the scale of construction was necessary to house 20 million annual increase in urban population. The question is not that whether prices should increase, but by how much is reasonable? It is impossible to perform a detailed econometrics study due to limited readily available data on the market cycles in China for analysis. Due to the limitations, this study performs a "back-of-the-envelope" analysis to determine whether supply might be outstripping demand.

Methodology

To arrive at a reliable framework to model supply and demand, we used official data from the Chinese National Bureau of Statistics (NBS) and formulated the following assumptions. We have come up with a framework to calculate supply and demand in terms of number of units. We collected both national and city data.

CALCULATION OF DEMAND (IN UNITS)

- Average Number of Households

The average number of households represents an estimate of housing demand, because household formation represents home buyers. The high homeownership rate in China suggests that most of the household formation translates to owners rather than renters. This data can be found readily available from NBS or from dividing total population with the average persons per household.

Associate Professor of Community and Regional Planning at Iowa State University suggests adding a vacancy rate percentage to the demand estimate. The idea is that an efficient housing market should offer prospective buyers a variety of choices of units so they might choose which one, if any, best suits their needs. (Woods & Barta, 2000)

CALCULATION OF SUPPLY (IN UNITS)

- Total Floor Space

$$\text{Total Floor Space} = \text{Population} \times \text{Floor Space per Capita} - \text{Demolitions}$$

$$\text{Square Meter} = \frac{\text{Square Meter}}{\text{Person}} \times \text{Persons}$$

- Average Flat Size

$$\text{Average Flat Size} = \text{Average National Household Size} \times \text{Floor Space per Capita}$$

$$\frac{\text{Square Meter}}{\text{Unit}} = \frac{\text{Persons}}{\text{Unit}} \times \frac{\text{Square Meter}}{\text{Person}}$$

- Total Units

$$\text{Total Units} = \text{Total Floor Space} / \text{Average Flat Size}$$

$$\text{Units} = \text{Square Meter} / \frac{\text{Square Meter}}{\text{Unit}}$$

Nation-Wide Data

We multiplied China's Urban Population with Floor Space per Capita in Urban China. Total Floor Space is obtained by subtracting estimated demolitions from the resulting numbers. Average Flat Size was obtained by multiplying Average National Household Size with Floor Space per Capita. Total units was obtained by dividing Total Floor Space with the Average Flat Size. This is our measure of housing supply. Housing demand is measured by average number of households.

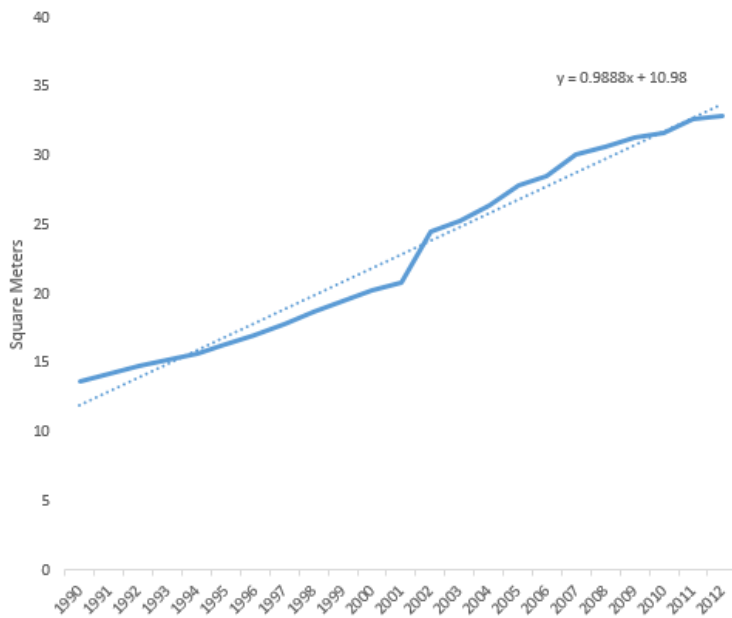
DEMOLITIONS

To estimate demolitions, we gathered data from State-Owned Assets Supervision and Administration Commission of the State Council. According to the commission, there was a total of 1.8 billion square meters of floor space demolished between 2008 and 2010. This implies an annual demolition rate of at least 4.5%. However, stock of dilapidated residential buildings should gradually decline as buildings are replaced with higher-quality construction. Furthermore, expropriation process is beginning to cost more due to enforcement of property rights (Henderson, 2009), which also slows down demolition rate. These numbers are in line with the depreciation rate from Chinese national accounts with average building life span of 50 years. Hence, we produced the following demolition rate chart, which will be subtracted from total floor space.

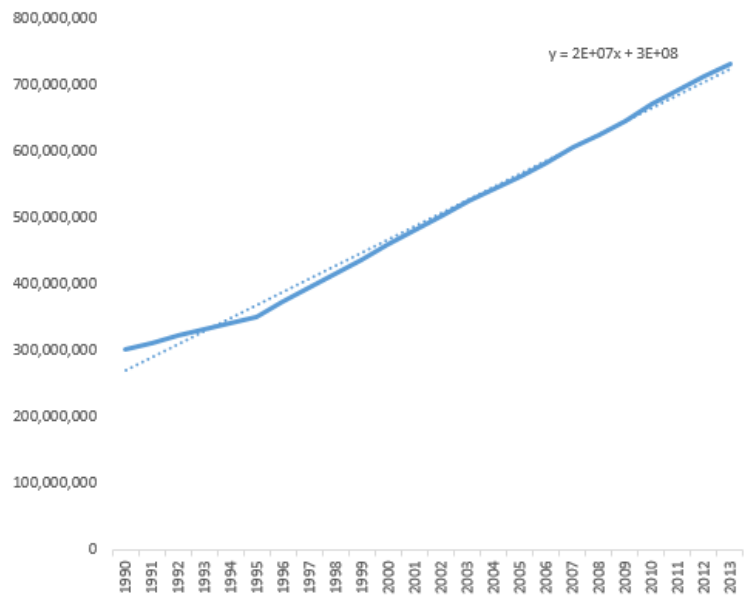
| Estimated Demolition Rates in Urban China | |
|---|-------|
| 2005 | 4.50% |
| 2006 | 4.50% |
| 2007 | 4.50% |
| 2008 | 4.50% |
| 2009 | 4.50% |
| 2010 | 4.50% |
| 2011 | 4.50% |
| 2012 | 4.33% |
| 2013 | 4.17% |
| 2014 | 4.00% |
| 2015 | 3.83% |
| 2016 | 3.67% |
| 2017 | 3.50% |
| 2018 | 3.33% |
| 2019 | 3.17% |
| 2020 | 3.00% |

URBAN CHINA DATA

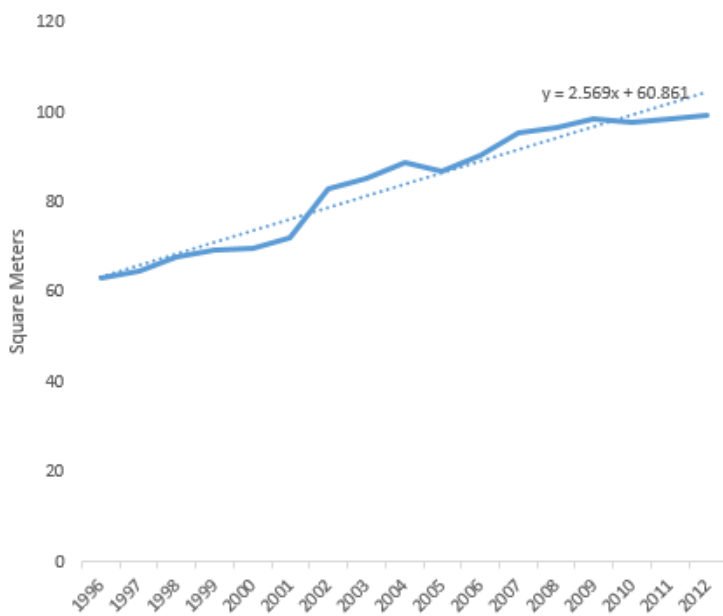
Residential Floor Area per Capita in Urban China



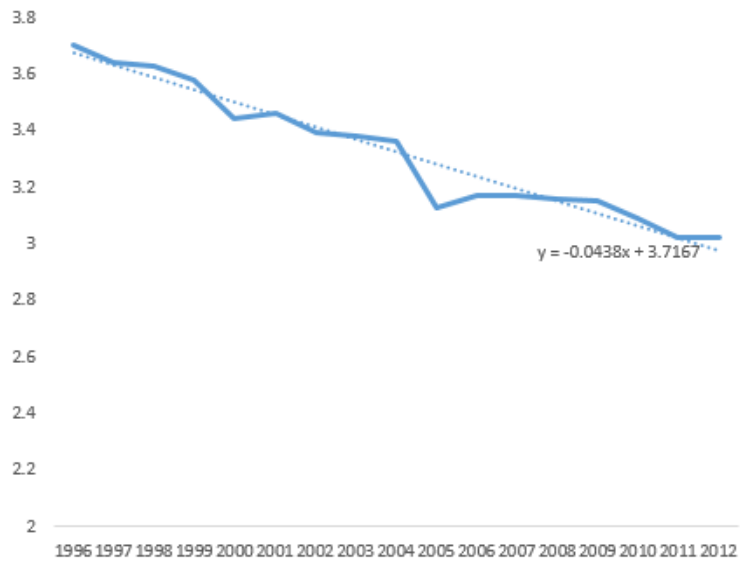
Population of Urban China



Average Size of Residential Flat in Urban China



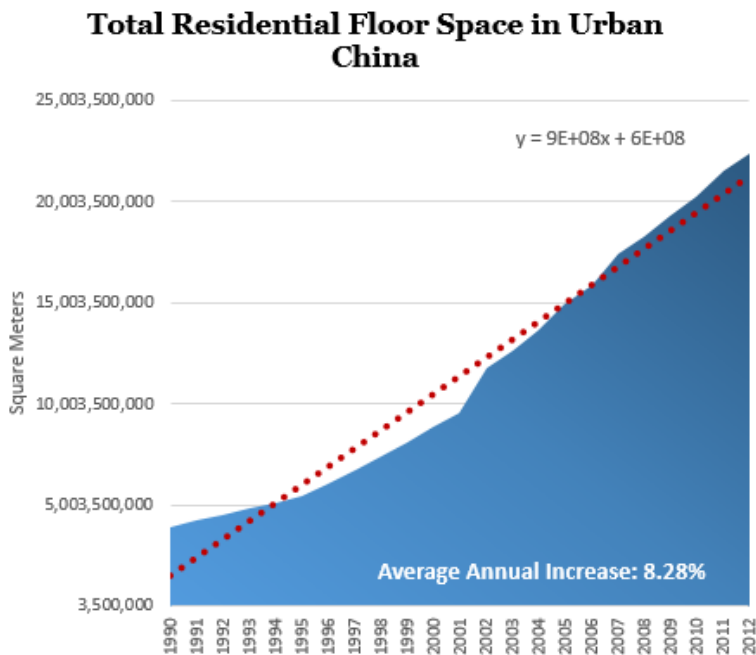
Average Household Size



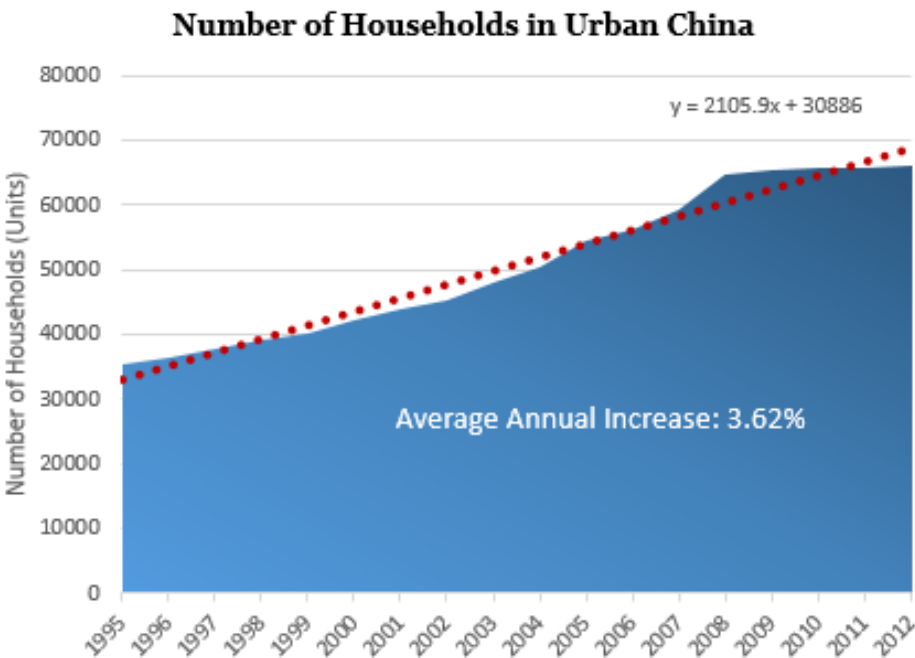
Sources: National Bureau of Statistics, Australia Reserve Bank, and “Sustaining China’s Economic Growth after the Global Financial Crisis” (Lardy)

Supply vs. Demand in Urban China (1996 – 2012)

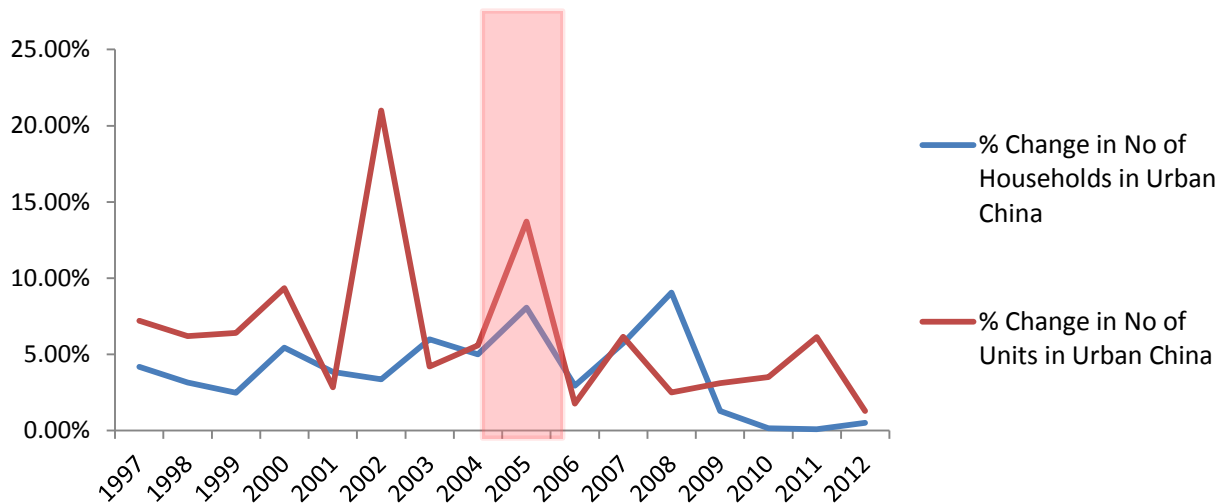
SUPPLY



DEMAND



Change in Supply and Demand (1996 – 2012)



We see that the average annual increase is 5.48% for supply but only 3.62% for demand. It may be possible that the nation started out with an incredible amount of supply shortage, but the data suggests that supply seems to be outstripping demand at the national level currently. Furthermore, Total Residential Floor Space (8.28%) is growing at a much faster pace than Total Units (5.48%). This is because while average household size has shrunk from 3.7 persons per household in 1996 to 3.02 persons per household in 2012, the average size of a residential flat in urban China has increased from 63 square meters in 1996 to 99 square meters in 2012. This led to a 193% increase in floor area per capita since 1996.

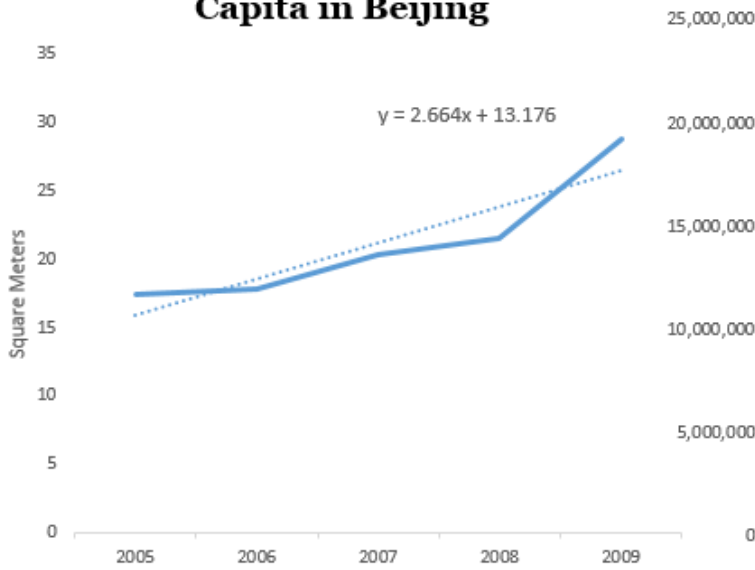
City-level Data

Understanding that real estate markets are local, looking only at national data would be insufficient in trying to answer the question of whether there are housing bubbles in China's cities. We analyzed data from 10 major cities in China: Beijing, Shanghai, Chongqing, Tianjin, Guangzhou, Nanjing, Wuhan, Dalian, Chengdu, and Hangzhou. We calculated total residential floor space for each city for a measure of housing supply.

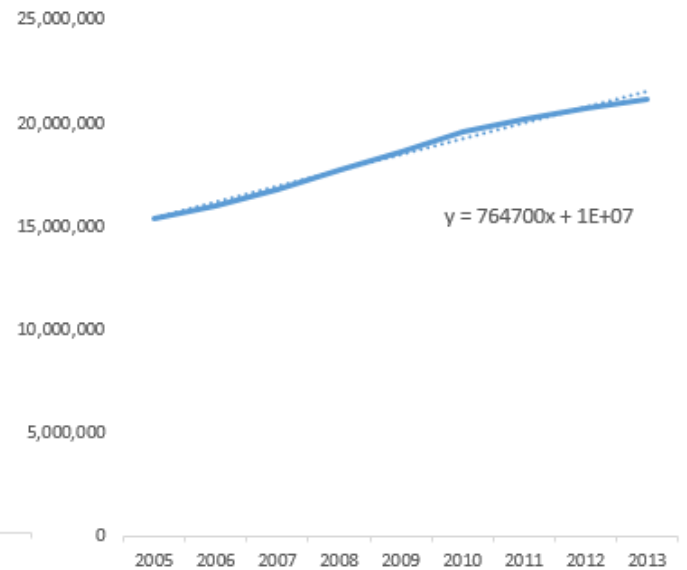
However, we had some doubts regarding the accuracy of the data for Number of Households at the city-level from National Bureau of Statistics. Official numbers reveal that number of households in many of the 10 cities did not increase much or at all. For example, number of households in Guangzhou, Dalian, Wuhan, and Chengdu remained constant since 1995 according to official numbers. Due to the high urbanization trends over the past two decades, we know that this simply cannot be true. This misrepresentation might be a result of statistics only the Huji (户籍) system. The Chinese relies on hukous (户口), or residential permits, to record the number of households in a city; however, there are many city residents holding illegal hukous, and these people are not reflected in the statistics. Due to limitations of the data from National Bureau of Statistics, we were unable to perform the precise demand vs. supply analysis in terms of number of flats at the city level. Nevertheless, we use Beijing as an example for city-level data, because the official numbers reflect a slightly more accurate picture of how much number of households have risen over the years, increasing 460% since 1995.

BEIJING DATA

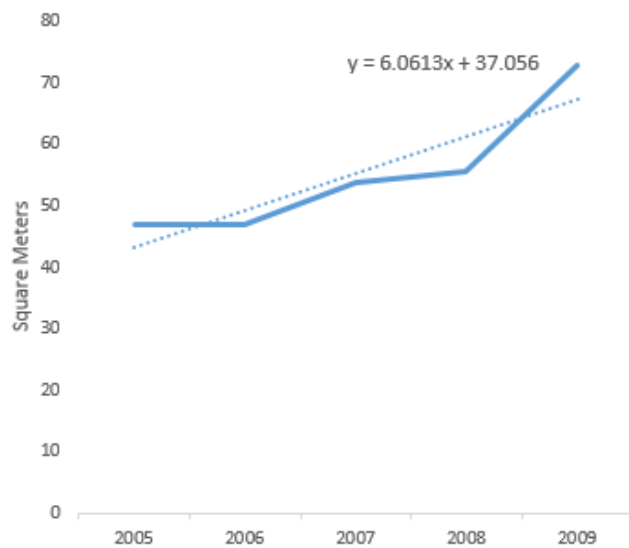
Residential Floor Area per Capita in Beijing



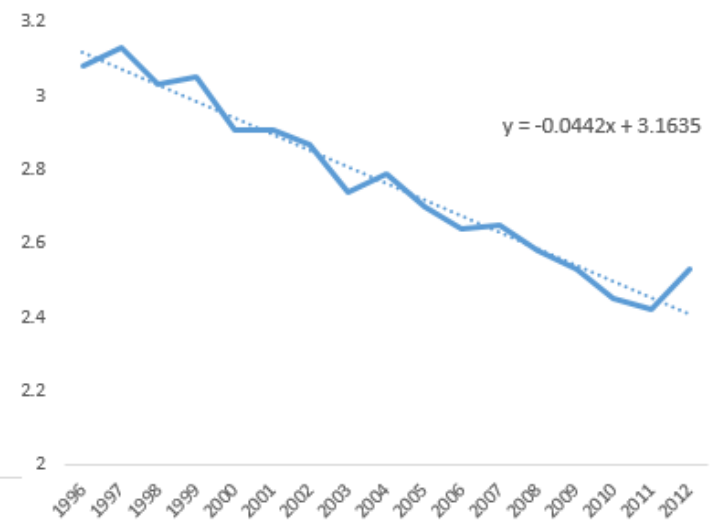
Population of Beijing



Average Size of a Flat in Beijing

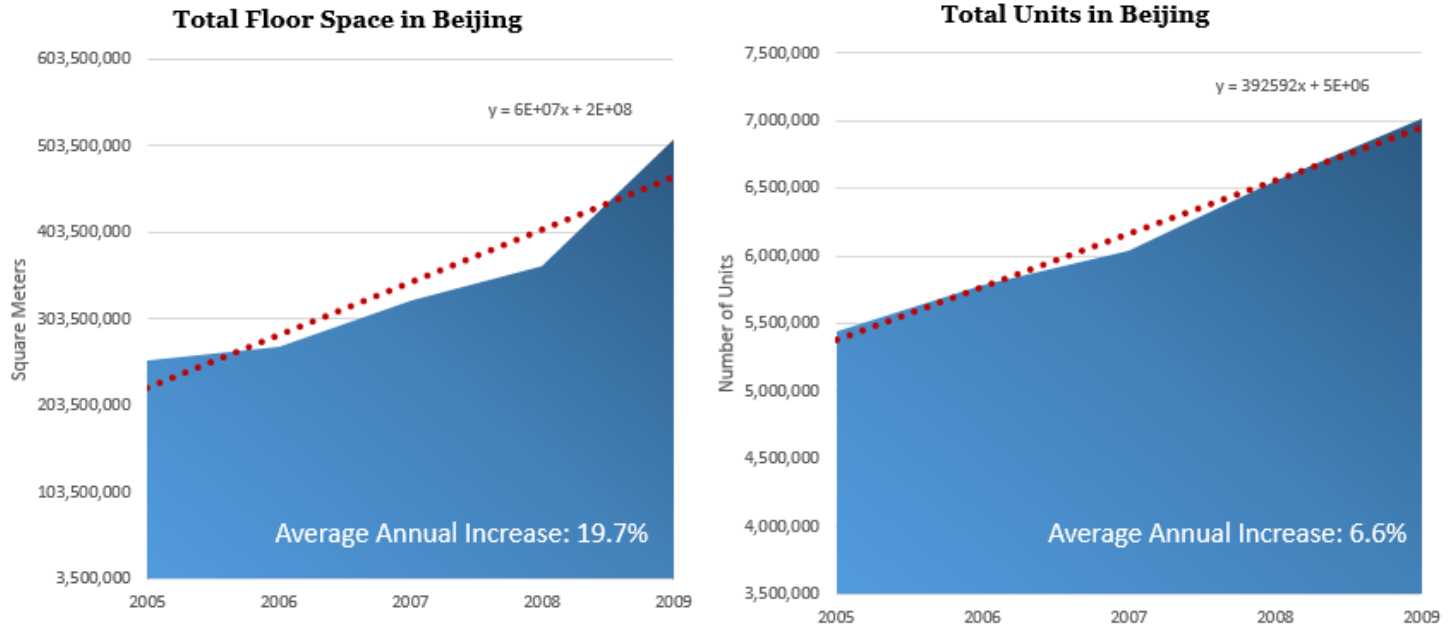


Average Household Size in Beijing

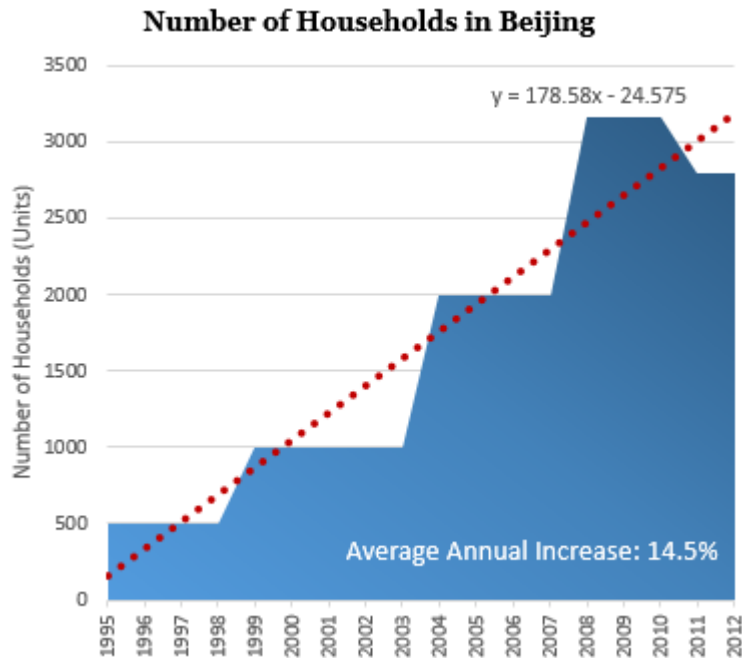


Supply vs. Demand in Beijing (2005 - 2012)

SUPPLY



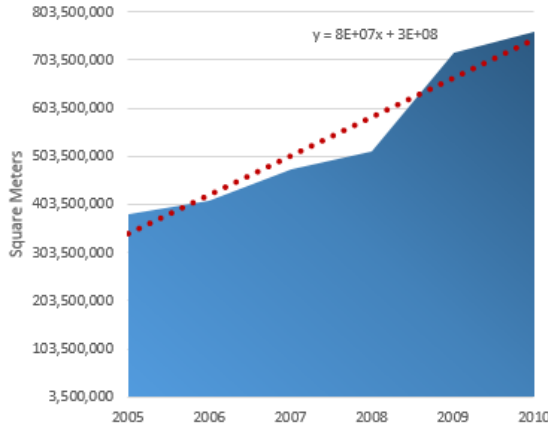
DEMAND



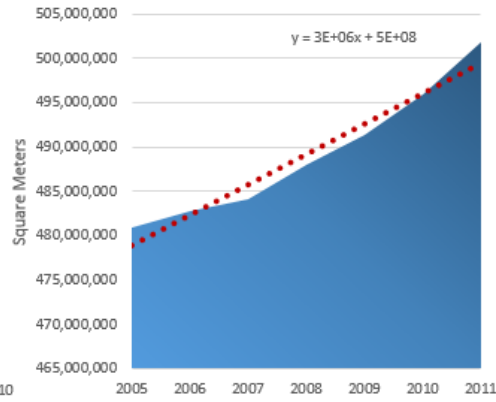
Data from NBS does not reach as far back for city-level data. We were able to calculate data for supply from 2005 – 2009. Although the data for number of households is staggered, the line regression provides an estimate for household demand from 1995 – 2012. Beijing has an average annual increase of 6.6% in supply, which is higher than the estimate for Urban China. On the demand side, we see an incredible average annual increase of 14.5% in number of households. This suggests that demand is exceeding supply at the Beijing city-level. Similar to national data, Total Residential Floor Space (19.7%) is growing at a much faster pace than Total Units (6.6%). This is because while average household size has shrunk from 3.1 persons per household in 1996 to 2.5 persons per household in 2012, the average size of a residential flat in urban China has been increasing at approximately 6 square meters per year. Hence, floor space per capita has been increasing at around 14% per year. However, the above information should to be taken with a grain of salt, as we only have 5 years of data for supply.

DATA FOR OTHER CITIES

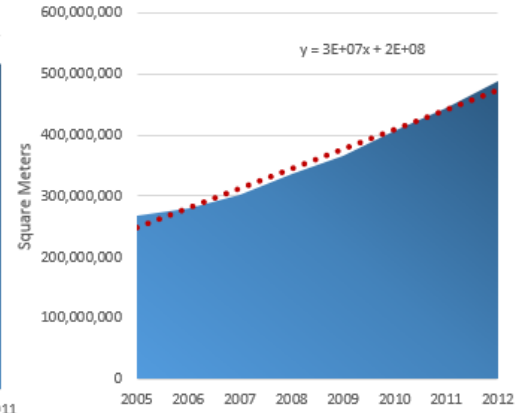
Total Residential Floor Space in Shanghai



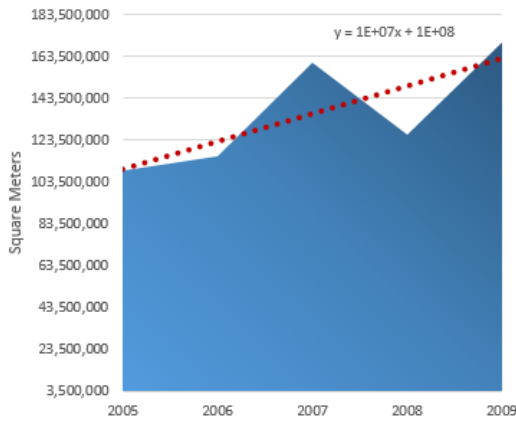
Total Residential Floor Space in Chongqing



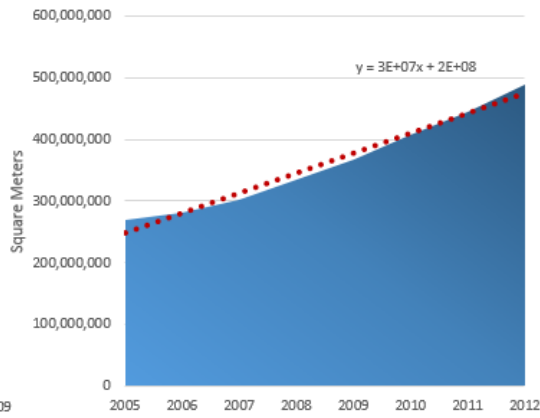
Total Residential Floor Space in Tianjin



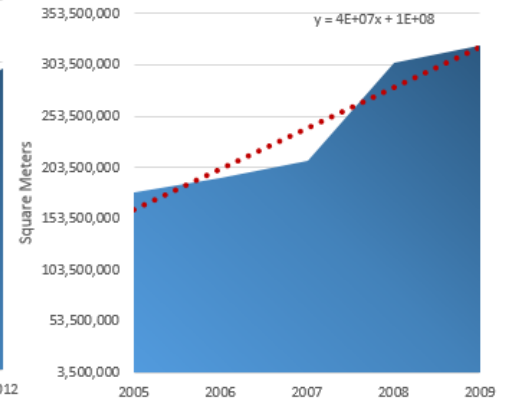
Total Residential Floor Space in Nanjing



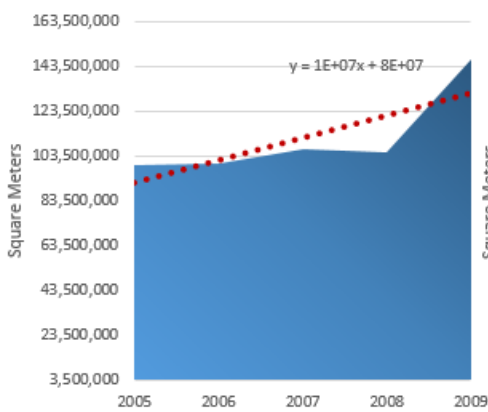
Total Residential Floor Space in Tianjin



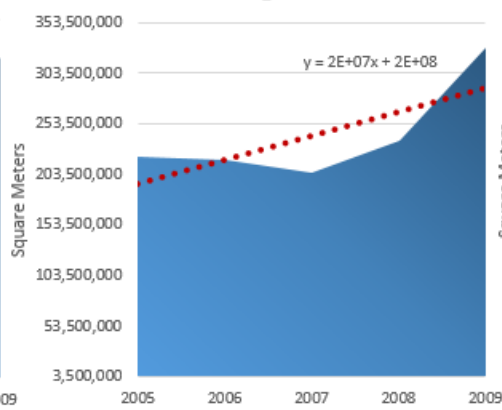
Total Residential Floor Space in Guangzhou



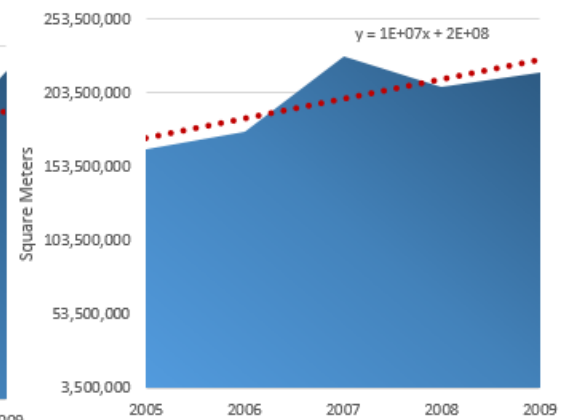
Total Residential Floor Space in Dalian



Total Residential Floor Space in Chengdu



Total Residential Floor Space in Wuhan



Conclusions

The landscape of China's property markets have changed drastically since the successful privatization of the housing sector in the 1990s. However, the years of extraordinary pricing growth give rise to concerns that pricing bubbles have formed in some cities. The collapse of these bubbles would lead to slowdown of the nation and potentially the global economy as well.

To combat large bubbles in cities, Chinese policy makers have implemented a series of corrective measures after 2008 to ensure a “soft landing”. Required reserve ratios for banks have increased 12 times in 2010-11, and interest rates at People’s Bank of China have been increased to curtail housing mortgages. Facing a tightening credit market, real estate developers have begun to produce fewer units. Yet, prices continue to escalate. To better combat housing bubbles, the Milken Institute suggests that property taxes should be better implemented in addition to the monetary policy instruments. Crowe et al. (2011) states that “higher rates of property taxation can help limit housing booms as well as short-run volatility around an upward trend in prices.” However, China’s property tax reform faces enormous challenges including resistance from influential interest groups. Successful establishment of a property tax as a major revenue source requires not only strong assessment techniques and tax design but also political determination and administrative reform.

In aggregate at the nation-level, supply seems to be exceeding demand with a higher amount of supply built each year than demanded from urbanization. Assuming data from National Bureau of Statistics is accurate, the high and escalating prices in China seem to be unjustified. Even if the cities had started with a large shortage of supply, we should have expected some slowdown in prices according to these trends. Prices do not necessarily have to fall, but an increase of 6-15% a year suggests a much stronger demand than supply, which is not the case at the national level.

However, at the city-level, Beijing seems to be experiencing the opposite. With an average annual increase of 6.6% in total residential units and an average annual increase of 14.5% in number of households, data suggest that demand is exceeding supply in Beijing. However, city-level data analysis is limited by lack of supply data pre 2005 and post 2012. With only 5 years of data for supply, we should take the results with a grain of salt. Due to inaccurate data for number of households, we could not perform a detailed supply versus demand analysis on the city-level data for the 9 other cities. However, we were able to calculate Total Residential Floor Space for the cities. It is evident through the graphs that the supply has been steadily increasing in each of the 10 major cities analyzed.

It seems that we are not the only ones realizing that the rising prices of residential prices in China's cities might be reaching a plateau. Big real estate players in China have begun to realize that the Chinese property market appears to be softening along with the rest of the country's economy. According to Cushman & Wakefield Research, the average yields for property transactions in Beijing has declined from 12.5% in 2004 to 6% in 2013. Similarly, property prices in Shanghai used to see average yields of 9% in 2004, which has decreased to 6% in 2013. Those who think that values have peaked have cut back on Chinese investing and are looking abroad to invest in foreign estates (Fung, 2014). However, not all developers think this way. For every transaction, there is both a buyer and a seller. Where smaller cities in China are facing swelling inventories and falling prices, Beijing is still seeing major constructions where investors believe the market is healthy and prices justified by fundamentals.

Despite the findings of this study, our view on the Chinese housing market is still cautiously positive. China has several factors in place that the US did not have during the housing meltdown in 2008. The Chinese government requires high down payments and limits the LTV on property purchases. Most of the homeowners have enough equity in their properties to withstand a price drop. Essentially, China has accumulated a large enough cushion against the possibility of a crash in their housing markets. Furthermore, the Chinese government's debt level is low at approximately 40% of GDP, compared to 92% in the United States (Li, 2013). China could also call in the \$3 trillion in foreign exchange reserves and \$700 billion in required reserves in People's Bank of China when they do need it. Consequently, China is arguably less vulnerable to a liquidity crunch than most other nations.

Therefore, while our study suggests that supply might be exceeding demand at the national level, a financial crisis the magnitude of the US Housing Crisis of 2006-2008 is unlikely to occur. However, the Chinese will face direct effects of the reduced residential investments as developers go bankrupt and mortgages default. The phenomenon of ghost cities will be more prevalent. The reduced property investments will have spillover effects in industries such as rugs, lamps, and lightning fixtures. We can also expect new construction to drop to very low levels. While China is more protected than U.S. was from the bursting of property bubbles, we do not need a financial crisis to happen for this to be important to China and the rest of the world.

Lastly, it is essential for China to compile consistent home price indices at both the local and national level. Regulators of China should improve the data collection practices to better access the effectiveness of current housing policies and to spot the early signs of a housing bubble.

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