A Study of urban housing affordability in China

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Abstract

This master thesis is devoted to understand urban housing affordability in China. The purpose of this thesis has been to investigate different approaches of studying housing affordability, and the policy and social complications of the measurement of Chinese urban housing affordability. The analysis is performed in three steps. The first part reviews articles and existing studies concerning the definition of housing affordability by Hui, 2001. Two approaches are used, and a new model is built based on the two to definitions of housing affordability. The second part presents data of Chinese housing affordability based on house price to income ratio-HPI ratio for Beijing and Shanghai. The income distribution is considered as the primary factor to use HPI ratio in this section. The third part examines reforms and policies regarding housing affordability, and analyzes the positive and negative roles of government in the homeownership based housing affordability development. The last part adjusts the social complications of housing affordability study, including better home quality and size, high saving rate and imbalance of demand and supply. In this section, Chinese social characteristics are studied with housing affordability. According to my study, housing affordability deteriorated after Chinese housing privatization. Low and middle income groups are suffering the most from it. Economic developed cites are suffering more than other cities. Government policies like social housing are not satisfying the needed groups. Housing provident fund is increasing the inequality among income classes.

Key-words

Housing affordability, house price to income ratio (HPI), housing privatization, income inequality, household saving rate, house Provident fund, affordable housing, property tax, house vacancy issue.
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# Table of contents and figures

1. **Introduction** ........................................................................................................... 8  
   1.1 Background ........................................................................................................... 8  
   1.2 Soaring house price, low income – houses beyond affordability ..................... 9  
   1.3 House vacancy issues ......................................................................................... 9  
   1.4 Overview of Data ................................................................................................. 10  
   1.5 Aim and structure of the thesis .......................................................................... 10  
   1.6 Limitation ............................................................................................................. 11  

2. **Theory and literature review** ................................................................................. 12  
   2.1 Definition of housing affordability .................................................................... 12  
   2.2 Ratio approach for housing affordability ........................................................ 13  
       2.2.1 Housing quantity to income ratio ............................................................. 13  
       2.2.2 Residual income approach ....................................................................... 14  
       2.2.3 Housing expenditure and non-housing expenditure approach ................. 15  
   2.3 Other Housing affordability measures .............................................................. 17  
   2.4 Overview of the disadvantages of the three ratio approaches ......................... 17  

3. **Historical background of housing related policies** .............................................. 18  
   3.1 Market mechanism introduced in 1979 ............................................................ 18  
   3.2 Housing privatizing ........................................................................................... 18  
   3.3 Housing Provident Funds (HPF) ....................................................................... 18  
   3.4 Social housing .................................................................................................... 19  

4. **Numerical measurement of house affordability – HAI and HPI ratio** ............... 20  
   4.1 Housing affordability index (HAI) .................................................................... 20  
   4.2 House price to income ratio (HPI) ................................................................. 21  
       4.2.1 HPI and income distribution .................................................................... 21  
       4.2.2 Housing affordability among different cities ......................................... 23  
       4.2.3 HPI ratio of Beijing from 1994 to 2007 ................................................. 25  
       4.2.4 HPI ratio of Shanghai ............................................................................ 26  

5. **Related policies** ..................................................................................................... 28  
   5.1 Housing Privatizing ............................................................................................ 28  
       5.1.1 Development of the Chinese Housing privatization policy ..................... 28  
       5.1.2 Influence of the Housing privatization .................................................. 29  
       5.1.3 Large number of Lay-off from SOE in 1990’s ....................................... 30  
   5.2 Housing Provident Funds (HPF) ....................................................................... 31  
       5.2.1 The collection of HPF fund .................................................................... 31  
       5.2.2 The effects of HPF in major Chinese cities ........................................... 32  
       5.2.3 Social issues of HPF .............................................................................. 32  
   5.3 Social housing ..................................................................................................... 33  
       5.3.1 The purchase of Social houses ................................................................. 33  
       5.3.2 Is Social housing really affordable? ....................................................... 34  
   5.4 Tax ....................................................................................................................... 36  
       5.4.1 Lower income tax .................................................................................. 36  
       5.4.2 Property tax ............................................................................................. 37  
       5.4.3 Issues of Chinese property tax ............................................................... 38  

6. **Complication factors of the figures regarding housing affordability** ............... 39  
   6.1 Better house quality and size push up building cost ......................................... 39
6.2 High household saving rate………………………………………………………………………………..40
6.3 Imbalance of house supply and demand cause high vacancy rate………………………………41
  6.3.1 Figures of house vacancy rate………………………………………………………………………..42
  6.3.2 Issues of the house vacancy rate……………………………………………………………………..42

7. Conclusion and further research…………………………………………………………………………..44

References…………………………………………………………………………………………………………46
List of table

Table 1: Data overview ..................................................................................10
Table 2: Housing affordability study of 25 Chinese cities.................................24
Table 3: HPI ratio of Peking from 1992 to 2001..............................................25
Table 4: HPI ratio of Shanghai from 1995 to 2005 based on Fudan university data........26
Table 5: Comparing the HPI ratio of Beijing, Shanghai and Guangzhou, 2001........27
Table 6: The structure of employment of China from 1993 to 2001....................29
Table 7: Salary based HPF in 7 cities..............................................................32
Table 8: Distribution of house subsidies in Guangzhou, 1998...........................33
Table 9: Beijing Housing Market Characteristics, 2003..................................34
Table 10: Income and expenses among different Peking income classes 2005...35
Table 11: Monthly and Annual Mortgage Payments on a Typical Unit in Beijing....36
Table 12: Table of Income Tax Rates in China for an Individual in 2009.............36
Table 13: Chinese Purchase new commercial house tax rate............................37
Table 14: Standard Commercial housing size in Shanghai, from 1990 to 1999.........39

Figure 1: China urbanization rate (%).............................................................9
Figure 2, The demand and supply of housing.............................................13
Figure 3: Ratio approach of housing affordability.......................................14
Figure 4: Residual income approach of housing affordability......................15
Figure 5: Housing expenditure and non-housing expenditure.......................16
Figure 6: List of Chinese administrative divisions by GDP per capita................22
Figure 7: China inequality from 1979 to 2004............................................23
Figure 8: Proportion of total floor space constructed by SOEs and Collective units. 30
Figure 9: Total floor space sold Commercial housing, 1987 to 1998..................30
Figure 10: Personal consumption as a percentage of GDP China and US...........40
Figure 11: Imbalance house supply and demand........................................42
1. Introduction

1.1 Background

China is the world’s second largest economy, and the estate sector is one of the most important sectors to bust the growth of Chinese economy. The rapid growth in the real estate sector (investment increased from 317 billion Yuan in 1997 to 2,568 billion Yuan in 2009) has led to around 10% annual economic growth in China for the past decades. In the meantime, GDP per capita increased about 2.5 times since 1997 to 22,542 Yuan in 2009 (see Table 1, data overview).

Since the housing reform (privatization or commoditization) in China spread national wide in 1998, government officers and academics have been concerned about high housing prices in the urban areas, which are mostly considered beyond the buying capability of the ordinary residents. The aim of this thesis is to provide an insight into housing affordability in urban China. At the 2010 parliamentary meeting in the beginning of March in Beijing, soaring real estate prices was one of the three major focuses to be discussed. Many proposals regarding housing price and affordability were submitted during the session. For example, levying property taxes (homeowner property tax) to luxury houses as an effective tool to control the bubble in the real estate market; offering financial assistant to young people who are struggling with the problem of high housing prices was also discussed. During the session, Chinese authorities expressed their determination to ‘rein in this wild-horse’ and keep the property prices at a reasonable level to make sure the durable and stable development of Chinese economy (Zhu, 2010).

Chinese urbanization

In this thesis, only urban housing is discussed. In the end of 2009, China’s total population was 1.33 billion, with 723 million (54%) and 607 million (46.6%) residing in the rural and urban areas respectively. In 2008, China had around 620 cities\(^1\), almost ten times as many as in 1940s. Increasing urbanization is the result of migration from villages, as well as natural increase, leading to the expansion of small towns which have been reclassified as cities (Mckinsey, 2008).

Chinese urban population is increasing dramatically for the past 35 years (see Figure 1); Chinese economic development for the past three decades has been closely tied to rural-urban migration. From just 18% in 1978, China’s urbanization rate has increased at 9% on average each year. China’s current plans to achieve a 67% rate by 2030 - shifting 280 million people to cities within two decades. The rapid urbanization process challenges for urban housing affordability (Kwan, 2010).

\(^{1}\) 122 cities with its population more than 1 million; 118 cities with its population more than 500,000; 115 cities with its population from 200,000 to 500,000; 264 cities with its population from 100,000 to 200,000. (Mckinsey, 2008)
1.2 Soaring house price, low income - houses beyond affordability

China is experiencing a tremendous rise in real estate construction, lending and speculative buying. House price nationwide rose 194% in 2009 (Smith, 2010) – which is blowing a price bubble and affects everyone who jumped into the business: homeowners, banks, developers, stock markets, and local governments (this thesis focus on homeowner and government). Since 1997 the Chinese medium house price tripled from 1,790 Yuan\(^2\) to 4,920 Yuan per sq.m in 2009 (see Table 1).

For a majority of Chinese households, salary is the only or most important financial resource for housing after the housing privatization (section 3.2). Considering the Chinese household income in the primary distribution of national income, the proportion that goes to salaries has been declining as the GDP growth at more than 10% for the past 8 years. Chinese salary only accounts for around 8% of the Chinese GDP, while the international average is about 45% in 2009 (Huang & Cheng, 2009).

According to the study of CASS (The Chinese Academy of Social Sciences), the average ratio of house prices to incomes (explained in section 2.2) in China, in 2009 is 8.3, which is far beyond the scope of reasonable affordability. The international convention states that figures around 3 are reasonable. In the capital city, Beijing, a typical 90 sq.m apartment costs about 80 times the average annual family income of the city’s residents, which means theoretically, an average Beijing family have to save 80 years to afford an apartment without other financial assistance.

Millions of Chinese are pursuing houses with an affordable price and financing assistances. Many economists are worried that the ‘unaffordability’ would cause series of social and economic consequences.

1.3 House vacancy issues

During recent years China has witnessed a significant upward movement in both rental vacancy rates and apartment vacancy rates. Empty residential buildings are sprouting across China as

\[^2\] 1,790 Yuan equals about USD 262 or 1,964 SEK; at exchange rate 1 USD=6.83 Yuan=7.49 SEK (April 2010)
companies with access to some of the 9.6 trillion Yuan (USD1.4 trillion, SEK10.5 trillion) in new loans in building properties (Tong & Yao, 2008). The area of vacant housing reflects the imbalance of supply and demand of the housing market (studied in section 6.3.1). Such deviations represent market disequilibrium which requires quantity and quality adjustment (Vioth, 1996).

1.4 Overview of data

Table 1 presents an overview of the Chinese economic development, housing price and housing market since 1997 (1998 was the last year of public housing). For the past 13 years since 1997, GDP increased 4 times and GDP per capita increased 2.5 times. Commercial house sales increased from 110 to 738 million sq.m, and in the meantime, the house price rise to its 2.7 times national wide. For lower income groups, affordable house price didn’t change as fast as commercial housing.

Table 1, Data overview

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP (Trillion Yuan)</th>
<th>GDP per capita (Yuan)</th>
<th>Urban living space per capita (sq.m)</th>
<th>Newly completed house (million sq.m)</th>
<th>Urban average house price (Yuan per sq.m)</th>
<th>House price annual increase rate</th>
<th>Affordable house price (Yuan per sq.m)</th>
<th>Urban real estate investment (billion yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>6.5</td>
<td>6,420</td>
<td>17.8</td>
<td>1,790</td>
<td>1,097</td>
<td>0.16%</td>
<td>1,093</td>
<td>610.3</td>
</tr>
<tr>
<td>1998</td>
<td>6.9</td>
<td>6,796</td>
<td>18.7</td>
<td>110</td>
<td>160</td>
<td>3.58%</td>
<td>1,035</td>
<td>361.4</td>
</tr>
<tr>
<td>1999</td>
<td>7.3</td>
<td>7,159</td>
<td>19.4</td>
<td>120</td>
<td>180</td>
<td>1,857</td>
<td>0.16%</td>
<td>410.3</td>
</tr>
<tr>
<td>2000</td>
<td>8.2</td>
<td>7,858</td>
<td>20.3</td>
<td>150</td>
<td>230</td>
<td>1,948</td>
<td>4.90%</td>
<td>1,202</td>
</tr>
<tr>
<td>2001</td>
<td>9.0</td>
<td>8,622</td>
<td>20.8</td>
<td>170</td>
<td>300</td>
<td>2,017</td>
<td>3.54%</td>
<td>634.4</td>
</tr>
<tr>
<td>2002</td>
<td>9.9</td>
<td>9,398</td>
<td>22.8</td>
<td>200</td>
<td>360</td>
<td>2,092</td>
<td>3.72%</td>
<td>779.1</td>
</tr>
<tr>
<td>2003</td>
<td>11.2</td>
<td>10,542</td>
<td>23.7</td>
<td>270</td>
<td>430</td>
<td>2,197</td>
<td>5.02%</td>
<td>1,380</td>
</tr>
<tr>
<td>2004</td>
<td>13.1</td>
<td>12,336</td>
<td>25.0</td>
<td>330</td>
<td>440</td>
<td>2,608</td>
<td>18.7%</td>
<td>1015.3</td>
</tr>
<tr>
<td>2005</td>
<td>15.2</td>
<td>14,053</td>
<td>26.1</td>
<td>470</td>
<td>510</td>
<td>2,937</td>
<td>12.60%</td>
<td>1315.8</td>
</tr>
<tr>
<td>2006</td>
<td>18.1</td>
<td>16,165</td>
<td>27.0</td>
<td>510</td>
<td>520</td>
<td>3,119</td>
<td>6.20%</td>
<td>1590.9</td>
</tr>
<tr>
<td>2007</td>
<td>23.0</td>
<td>18,934</td>
<td>28.1</td>
<td>650</td>
<td>560</td>
<td>3,645</td>
<td>16.86%</td>
<td>1708.5</td>
</tr>
<tr>
<td>2008</td>
<td>30.0</td>
<td>22,214</td>
<td>29.1</td>
<td>520</td>
<td>663</td>
<td>3,936</td>
<td>8.2%</td>
<td>2033.6</td>
</tr>
<tr>
<td>2009</td>
<td>32.5</td>
<td>22,542</td>
<td>30.0</td>
<td>738</td>
<td>702</td>
<td>4,920</td>
<td>25%</td>
<td>2567.4</td>
</tr>
</tbody>
</table>


(The definition of affordable housing is studied by different approaches in the literature review.)

1.5 Aim and structure of the thesis

The aim of the thesis is to study the urban housing affordability in China with different approaches, measuring the advantages and disadvantages of each approach. With the data of Beijing and Shanghai, numerical approaches are used to study the affordability in these two cities. The research questions for this thesis are:
(1) Do regions with higher GDP per capita suffer less or more from housing affordability issues?
(2) Is housing getting more affordable or less affordable after the privatization?
(3) Which income class faces more difficulties to afford housing?

**Structure of the thesis**

The literature review examines three ratio approaches of housing affordability, and introduces a historical background of housing-related policies. Section 4 includes a numerical study of Chinese urban housing affordability: HAI ratio, HPI ratio, and income distribution. Four policies related to housing affordability are examined. The last part introduces complications factors of China urban housing affordability due to the unique Chinese culture and social characteristics.

**1.6 Limitation**

The thesis is limited in several regards. In this thesis, only urban housing affordability is discussed; rural housing is not studied here. Housing affordability is discussed based on home ownership not rental, and also only residential dwelling is discussed. Housing affordability in this thesis is studied at the macro level and not at the micro level. The studies are focusing on government and house-buyer, not developers.
2. Theory and literature review

2.1 Definition of housing affordability

Housing affordability express the linkage between the wellbeing of individual families and the mechanism of housing provision and income determination (Stone, 1993). ‘Housing affordability’ has becoming a common way of summarizing the nature of housing difficulties in many nations. A household is said to have affordability problem, in most formulation of the term, when it pays more than a certain percentage of its income to obtain adequate and appropriate housing (Hulchanski, 1995). Housing affordability has become a common concept to summarize the nature of accommodation conditions in the literature. However, despite the worldwide popularity among media and policymakers, the meaning of ‘housing affordability’ still remains virtually unclear until today (Stone, 2006). The principle to define affordability is still vague and struggling between; for example; the ‘can’t pay’ economic principle used the predefined ratio of housing costs to income (Hancock 1993). However, income can be a misleading measure of housing affordability, for example, many retirees have low annual incomes, yet they own their homes (Quigley, 2004)

On the micro level, housing affordability varies among individual households. The most important factors are house price, family income and wealth. Besides that, down payment as a percentage of price, loan term interest rate, mortgage insurance (monthly premium plan), closing costs as a percent of sale price, annual property taxes (not available in China yet), insurance as a percentage of home price, maximum ratio of monthly housing expense to income, maximum ratio of total housing expense to income and numbers of people in the family are considered to measure the affordability of individual households. In China, as mentioned in section 5.2 and 5.3 in this thesis, affordability is also largely affected by the access to housing provident fund and social (affordable) housing.

On the macro level, affordability concerns the distribution of housing price, the distribution of house quality, the distribution of income, the ability for household to borrow, public politics affecting housing markets, conditions affecting the supply of new or refurbished housing, and the choices that people make about how much housing to consume relative to other goods. The mixed issues raise difficulties in interpreting even basic facts about housing affordability. For example the rapid rise in the homes clearly made home ownership more difficult for buyers, but it also greatly reduced the financial cost of home ownership to a larger group of existing homeowners by providing substantial financial gains. According to Quigley (2004), inflation also effects housing affordability. As inflation increase, nominal interest rates and house price increase, which more than counterbalances any increases in nominal wages, so that inflation makes housing less affordable.

In China, ‘housing affordability’ has come into widespread usage in the last 15 or so years. Based on home-ownership principle, to afford a house with reasonable price is one the biggest Chinese Dream. However affordability as a concept is, as mentioned above difficult to define, it concerns many policies and social complication factors, which are discussed in this thesis.

Definition of housing affordability in this thesis

In this thesis, ‘afford’ is defined as having enough financial resources to pay a very basic house with necessary equipment and facilities without incurring financial difficulties, or cutting other expenses in a large scale. The primary factors concerning housing affordability are disposable household income and housing cost. Different income classes have different desirability for housing (quality, size, location, equipment, environment and facilities ext.). Housing market
segmentations and the distribution of income among regions and income classes is studied in this thesis.

The demand side of Chinese urban housing market consists of low-income class, middle income class and high income class. The supply side if urban housing market consists of low quality suburban housing, medium quality fringe housing and high quality urban central housing. In this thesis, market equilibrium of these three market segmentations will be examined separately.

As in Figure 2, we can see that before the housing privatization, public housing (state own rental housing) was supplied to low-income and middle-income groups. After the housing privatization, housing demand of low-income and middle-income classes is satisfied by social (affordable) houses and low quality suburban housing. This thesis is to study that to what degree is the supplying of affordable housing is meeting the demand of needed groups.

Figure 2, The demand and supply of housing (before and after housing privatization)

2.2 Ratio approach for housing affordability

Considering the household income as the most important factor for housing affordability, by calculating the ratio of housing expenditure and household income/residual income are easy ways to measure the affordability. There are three ratio approaches of housing affordability studied in this thesis; the first one is housing quantity to income ratio, and the second is Residual income approach. The third one is housing expenditure and non-housing expenditure approach.

2.2.1 Housing quantity to income ratio

House quantities to income ratio explained the housing affordability related to the quantity of housing with pre-defined income to house expenditure ratio.

Figure 3: Ratio approach of housing affordability.
In Figure 3, the X-axis (H) denotes the housing quantity, while the Y-axis (Y) refers to income or cost of housing. OJ is a line which gives a pre-specified ratio of housing expenditure to income. It is upward sloping, reflecting the general increase in housing consumption with income. OJ divides the graph into two zones, white and grey. Any point lying on OJ (e.g. point E) or above OJ (white area, e.g. point A) represents that housing is affordable. By contrast, any point in the grey area (e.g. point B) indicates lack of affordability.

At point A, a given household is expected to spend $Y^*$ to consume $H_a$. As the cost for $H_a$ ($Y_a$) is lower than $Y^*$, the household would have enough money to obtain $H_a$. There is no ‘excessive burden’ on income. At Point B, the cost of housing is $Y_b$, which is higher than $Y^*$, the amount expected to be used to consume $H_b$. It implies that ‘excessive burden” exists. The household is considered to lack housing affordability.

**Advantage and disadvantage of the module**

This ratio approach of housing affordability presents the relation between house quantity and house / non-house consumption, which could be used to analyze the housing affordability based on various market segmentations. The module is based on pre-specified ratio of housing expenditure to income, so the disadvantage of it is that it could not reflect the change of housing to non-housing expenditure ratio, which varies significantly from family to family.

**2.2.2 Residual income approach**

The second approach defines housing affordability by the amount of residual income.
In Figure 4, the X-axis (H) measures housing consumption and the Y-axis (N) measures non-housing consumption. Assuming that the minimum consumption of housing is $H^*$ while that of non-housing goods is $N^*$. $H_{\text{MAX}}$ is the maximum amount of housing provided by the relevant authority. The designation of $H_{\text{MAX}}$ is to restrict excessive consumption of housing. Over-consumption results in wasting resources, which means high costs per unit of housing service consumed. Any point in region (3) indicates inadequate consumption of both housing and non-housing goods. In region (4), housing consumption is adequate while non-housing consumption is not. Any point in region (1) or (2) means that non-housing goods are adequate, while housing may or may not be adequate. In short, in the residual income approach housing is considered affordable when people can adequately consume both housing and non-housing goods. In order to enhance the ability of non-housing consumption, it is suggested that low income households could be benefited by housing subsidies, rent reduction and prices negotiation (Hui, 2001).

**Advantage and disadvantage of this module**

This residual income approach presents the housing affordability concerns the ratio of housing to non-housing consumption, which compensates the former module in some degree. But this module problematizes the study of affordability, because it is based on the minimum consumption of housing and non-housing goods, which is quite subjective and varies among different income classes, cities and regions, as well as the supplying of housing. Residual income approach cannot be used to study the housing affordability on a macro level.

**2.2.3 Housing expenditure and non-housing expenditure module**

Based on the previous two approaches, the third approach presents the housing affordability concerning housing and non-housing consumption, changes in house price and income.

Assuming all the households depending on just income (no saving, no other wealth considered as in figure 3 and 4) to buy house and other expenditures, the figure below shows the effects of changing house price and household income.
In Figure 5, X-axis denotes quantity of the housing, while Y-axis refers to non-housing expenditures (non-housing expenditure) including, for example, food, transportation, clothing and education. Assuming the price per unit of non-housing consumption to be 1, the non-housing expenditure is equal to the quantity of non-housing consumption.

\[ X = P \cdot S \]

- \( X \) – Housing expenditure
- \( P \) – Relative price per unit of housing
- \( S \) – House size

If the price of housing decreases larger quantities of housing can be consumed, and hence the budget line will shift from \( X_B \) to \( X_C \). \( X_A \) is the minimum housing expenditure, and \( Y_A \) are the minimum non-housing expenditures. Budget line \( Y_BX_B \) indicates that that point O, both minimum house consumption and non-housing consumption can be satisfied. Any point in region (3) indicates inadequate consumption of both housing and non-housing goods. Region (1) indicates inadequate of housing consumption but adequate of non-housing consumption. Region (2) indicates that, as the house price increase or the demanding of house size increase, it will be inadequate of non-household consumption in the budget line \( Y_BX_B \).

As the house price per unit is increasing, housing expenditure \( X \) increases, the budget line must shift from \( Y_BX_B \) to \( Y_CX_D \). The house expenditure to non-housing expenditure ratio increases, so more family income has to be distributed to housing consumption.

With higher income (or other financial aids), the budget line shifts from \( Y_BX_B \) to \( Y_CX_D \). Any points in region (4) indicates adequate both housing consumption and non-housing consumption.

Without saving, other wealth and other financial aids, increasing housing price would cause immediate negative effect on the affordability of both housing goods, and non-housing goods.

**Advantage and disadvantage of this module**

This approach compensates the previous two approaches, and makes it possible to discuss the relationship among income, the price of housing, the price of non-housing consumption, and other financial incomes. As for the disadvantage, in this module, household income is considered...
as the only financial resource of purchasing house, so other distortion factors like housing subsidies (for example Housing Provident Fund at section 5.2), family savings and other capital incomes will be discussed in the later chapters.

2.3 Other housing affordability measures

The deposit to income ratio is the minimum required down payment for a typical mortgage, expressed in months or years of income. It is especially important for first-time buyers without existing home equity. If the down payment becomes too high then those buyers may find themselves ‘priced out’ of the market.

The Affordability Index measures the ratio of the actual monthly cost of the mortgage to take-home income. It is used more in the United Kingdom where nearly all mortgages are variable and pegged to bank lending rates. It offers a much more realistic measure of the ability of households to afford housing than the crude price to income ratio. However it is more difficult to calculate, and hence the price to income ratio is still more commonly used.

The Median Multiple measures the ratio of the median house price to the median annual household income. This measure has historically hovered around a value of 3.0 or less, but in recent years has raised dramatically, especially in markets with severe public policy constraints on land and development.

2.4 Overview of the disadvantages of the three ratio approaches

Using ratio approaches to study housing affordability explain the relation between incomes, housing consumption and non-housing consumption. Housing affordability is far more complicated than this. In the next section, HAI (housing affordability index) and HPI (house price to income ratio) numerical approaches are examined to study housing affordability.

The limitation is also that the study of housing affordability by ratio approaches is based on short term household’s income. Housing choice anchors many other consumption activities. Thus, housing choices are likely to be made based on self-assessments of permanent income rather than current income and households are unlikely to adjust housing consumption in response to short run fluctuations in economic conditions (Quigley, 2004).
3. Historical background of housing related policies

To be able to study the Chinese housing affordability, the following housing reforms and polices (further studied at section 5) need to be addressed: The market mechanism introduced in 1979; Housing privatizing started in 1980’s; Housing provident fund; and Social housing (affordable housing).

3.1 Market mechanism introduced in 1979

In 1979 China started to introduce market mechanisms into a socialist economy. Important structure changes in the economy occurred - such as relaxation of goods, and opening up for foreign investment. The rapid expansion of its international trade and large capital inflows provide evidence of the increasing integration of China in the world economy. Since 1980, China’s share in international trade has trebled, rising from less than 1% to more than 3% in 1999 (Lemoine, 2000). For the housing market, more and more lending and speculative buying activities started to pursue the high return, and one of the biggest changes ever taken place after the 1979 economy reforms was the privatization of housing. China’s land market and real estate market have been developing concurrently since China’s ‘reform and opening up’ (shifting from planned economy to market mechanism) in 1978.

3.2 Housing privatizing

China’s housing market and policy context are relatively unique, differing from those of Europe and the US. As economic reforms started in 1979, market mechanism was introduced to real estate market like in industries. China’s policymakers started to privatize the publicly-owned housing stock that had been previously rented from the state or state-owned enterprises (SOEs) in the beginning of 1980s. The privatization started in small towns and cities, and was applied national wide in 1998.

The new approach of housing privatization policy was initiated by the government under Deng Xiao Ping (who also initiated the Market mechanism in 1979) in the early 80’s. Reforms began from the assumption that housing shortage was caused by the welfare character of housing. Policy makers believed that the only effective way to solve the urban housing problem was to increase rents of public housing and to encourage urban citizens to buy houses from government or their work unit or build their own housing (Wang, 2004).

More was happening in the process of privatization. The previous state-own work units\(^3\) were reformed to private organizations and companies. The previously state own housing was sold to employees as commercial housing. The changes also include institutional reforms in the pricing of land, in the financing of construction and distribution of housing. For home owners, housing privatization policy changed the buying-selling mechanism in a large scale (further studied in section 5.1).

3.3 Housing Provident Funds (HPF)

China HPF was introduced in early 1990’s and has encouraged workers to save a portion of their income for residential property purchases as one of the most important policies to improve home ownership. This program, which is similar to housing fund programs in other countries such as

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\(^3\) Chinese work unit (danwei) is the name given to a place of employment. The term ‘work unit’ remains in use today it is more properly used to refer to a place of employment during the period when the Chinese economy was still more heavily socialist or when used in the context of one of state-owned enterprises.
Thailand and Singapore (Chinese HPF was established based on Singapore HPF system), combines a savings and retirement account with subsidized mortgage rates and price discounts to provide a mechanism through which an employee could save for and eventually complete, a housing purchase (Gu, 2004). Housing provident fund is an income based subsidy to employees, which is contributing to the inequality of housing affordability (further studied in section 5.2).

**Development of China HPF**

The housing provident funds were initially introduced as a pilot program in Shanghai in late 1991 and were extended nationwide in 1995. The program is open to employees of government agencies, state enterprises, universities, hospitals, and some semi-state companies. Recently the government has mandated that all eligible employees must join the program, although privately employed workers do not have to participate (Gu, 2004). In March 1999, the State Council issued the Housing Provident Fund Management Provisions, as a legal tool to standardize HPF decision-making procedures and fund management. From this point onward, all cities (above county level) were required to set up HPF schemes and it was stipulated that all enterprises (including private firms, joint ventures and private enterprises), government agencies, public institutions and social organizations with employees on their payrolls had to take part in the HPF system (State Council, 2002).

3.4 Social housing (ownership based, not renting public housing)

The limitation of HPF (benefiting only middle and high income classes) could be compensated by the social housing (affordable housing) system to some degree. The traditional social democratic and labor view has been that the housing market is characterized by imperfect competition (i.e., asymmetric information, transaction cost, search cost and externalities); the government should intervene in the house sector in order to ensure decent basic housing standard for lower income families; to household too poor to afford a decent basic accommodation without paying excessive proportion of their income (Zenou, 2010).

Besides the Housing Provident Fund, another principal homeownership-oriented public policy is the development of ‘Social housing’. The policy is designed for lower-middle and low-income urban residents and involves government subsidies and profit caps for developers. The primary subsidy vehicle making the program possible is administrative allocation of state-owned land at no cost. Projects are also often subsidized by the reduction in development costs and fees paid to local government.

In order to maintain affordability, real estate developer profits are limited to 3 percent and units are generally smaller than commercial apartments. Actual selling prices are supposed to be checked to ensure that they remain below agreed upon thresholds in order to avoid capture of the subsidy by developers (TengXun Finance, 2009).
4. Numerical measurement of house affordability
   -HAI and HPI ratio

There are many indexes used to measure the affordability of residential housing worldwide. In US, Federal Housing Finance Agency (formerly Office of Federal Housing Enterprise Oversight as known as OFHEO) publishes the HPI index to measure housing affordability. Case and Shiller developed the Case-Shiller index prices which are measured monthly and tracks repeated sales of houses using a modified version of the weighted-repeat sales methodology. In China, HAI and HPI ratio are the most popular ways to numerically measure the affordability of housing (Yu & Wang, 2011).

HPI and HAI ratio study housing affordability at the macro level concerning household income, housing consumption and house price. HAI is a monthly index, while HPI is an annual index.

4.1 Housing affordability index (HAI)

HAI is a monthly housing affordability index which provides a way to track over time whether housing is becoming more or less affordable for the typical households. HAI rate measures housing affordability of potential home-buyer on the basis of percentage. If it is rated at 100% this means that a house in the correspondent price range should be able to be purchased based on the income the household earn. When you have less than 100%, most lenders consider you as less than able to afford a home. HAI incorporates changes in key variables affecting affordability, housing prices, interest rates, and income.

The HAI index has a value of 100 when the median-income family has sufficient income to purchase a median-priced existing home. Chinese HAI is calculated based on CREIS, which is the mostly used Chinese median home price, the first and most authorized index system with databanks pool the records of investors, developers, construction firms and consultancies. A higher HAI index number indicates that more households can afford to purchase a home.

HAI = (Median Family Income / Qualifying Income) * 100

Qualifying income is derived from the monthly payment on the median-priced existing home, at the effective mortgage interest rate. The HAI assumes borrowers make a 20 percent down payment and that the maximum mortgage payment is 25 percent of gross monthly income for the household.

HAI figures of Beijing

The 2008 HAI figures of Beijing shows that, the median HAI Beijing 2002 to 2004 is 75, 65.78 in 2005, 51.33 in 2006, which means with 20% down payment, Beijing families earning the median family income just 75% sufficient to afford a house from 2002 to 2004, median family income was only 51.33% sufficient to afford a house in 2006, with conventional loan covering 80 % of house value. In 2010, the average HAI Beijing is only 47. 21% (CREIS, 2012), which means a median household income is not even enough to afford half of housing and non-housing expenditure.

Advantages and disadvantages of using HAI to measure housing affordability

Comparing to the ratio approaches in the first section, HAI is not limited by pre-specified income to house expenditure ratio, and pre-specified minimum housing and non-housing
expenditure. The disadvantage of using HAI is that the measure of housing affordability is based on the assumption that ‘mortgage payment accounts for no more than 25% of household income’, while in reality most low middle income class in China spend more than half of the monthly income on housing and mortgage is not as easy to access in China as in western countries.

4.2 House price to income ratio (HPI)

The price to income ratio is the basic affordability measure for housing in a given area. It is generally defined as the ratio of median house prices to median familial disposable incomes, expressed as a percentage or as years of income. It is sometimes compiled separately for first time buyers and termed attainability. This ratio can also be applied to individuals, which is a basic component of mortgage lending decisions.

Operationally, for an individual household the House price-to-income ratio (HPI) maybe defined as the ratio of the current market value of the housing unit that the household occupies to the total annual income of the household. For a group it may be defined as the ratio of the median free-market price of dwelling unit to the median annual household income (Lau, 2001).

\[
\text{HPI ratio} = \frac{\text{AP} \times \text{FA}}{\text{AY} \times \text{nP}}
\]

Where
- \(\text{AP}\) = mean selling price of residential building (Yuan/m\(^2\));
- \(\text{FA}\) = pre-specified gross floor area per housing unit (m\(^2\));
- \(\text{AY}\) = mean per capita annual income per urban household (excluding tax, house provident fund, medical insurance, unemployment insurance and retirement insurance);
- \(\text{nP}\) = average number of persons per urban household.

The international convention states that HPI figures around 3 are reasonable (Bertaud, 2013). According to the latest statistics, most of the small and medium cities’ house price to income ratio range from 6 to 8 in China, the national average HPI in 2011 was 7.4 (Jinghua estate news, 2012), which means families have to save more than 7.4 years without any expenditure to afford buying a house or apartment (excluding the mortgage and other financial assistances).

4.2.1 HPI and income distribution

Using HPI to measure the housing affordability in China, the primary concern is the income distribution. China as the most populous country in the world with over 1.3 billion people and 620 cities (2009), income inequality must be considered when we study housing affordability across the country.

Income inequality in China

Rising inequality has been a common feature of international economic development in the most recent decades and China is no exception. One of the world’s most egalitarian societies in 1970s, China in 1980s and 1990s became one of the most unequal countries in the world (Zhao, 2001). Inequalities, slums and poverty have started to rise in Chinese cities partly because of the very-market oriented housing policies implemented in the last decades and partly because of China’s unique ‘hukou system’ of home registration, which restricts permanent migration to cities but allows a large amount of temporary migration, thereby creating a group of urban residents with restricted rights known as the ‘floating population’ (Zenou, 2010).
Chinese income inequality rose substantially from 1985 to 2001 because of increases in inequality within urban and rural areas and the widening rural-urban income gap. ‘We find that China’s dramatic economic growth - a five-fold increase in the economy and a four-fold increase in per capita income since the early 1980s - has disproportionately favored the urban areas and the rich’ (Wu, 2004).

Distribution of GDP per capita is one way to measure the distribution of wealth. In 2012, Chinese national average GDP per capita is USD 6,091. The regional inequality of GDP per capita is presented as follow. The most developed coastal regions have GDP per capita twice as much as the second category, 3 times as much as the third. The question is: Do regions with higher GDP per capita suffer less from housing affordability issue?

**Figure 6: List of Chinese administrative divisions by GDP per capita**

![Map of China's provincial divisions by GDP per capita](image)

National per capita: USD 6,091
- over 10,000
- USD 8,000- 10,000
- USD 5,000-8,000
- USD 4,000-5,000
- USD 3,000-4,000


Another way to study the inequality is by using the Gini index. If we use Gini index to measure the income equality in China, we can find that the Chinese Gini index increased from 0.27 to 0.5 from 1979 till 2010 (the most unequal society will be one in which a single person receives 100% of the total income and the remaining people receive none (G=1); and the most equal society will be one in which every person receives the same percentage of the total income (G=0). The Gini Coefficient from 0.2 to 0.4 means that the wealth has been evenly distributed in the country, while Chinese Gini coefficient exceeded the alert level-0.61 (Li, 2013). In the housing market, uneven distribution of wealth makes a lot of Chinese own too many houses, and some Chinese cannot even afford a basic one. Real estate industry produces many super-riches in China by speculating and escalating house price; which contribute to the widening gap between rich and poor.
Figure 7: China inequality from 1979 to 2004

Source: Hahn (2008), Business environment, East Asia and Pacific Education.

Figure 7 presents the inequality among regions (provinces) in China. The Gini coefficient peaked at 45% in 2003. According to the Chinese statistics bureau 2003, the bottom 20% Chinese own only 4.7% of the wealth, and the top 20% Chinese own more than 50% of the country’s wealth. This is mainly due to the rural urban income differences. During the 1979 economy reform, Chinese believed that the right way to develop is to ‘letting some people (cities) get rich first’ and then ‘changed to attaching greater importance to social equity’. Cities like Beijing, Shanghai and other major cities developed much faster than the rest of the cities or rural areas, benefiting from lower tax, and some other government aids. In the meantime, inequality between rural-urban, coastal-inland rose. The income inequality is the uneven distribution of income and wealth among regions (provinces), age groups, occupations, industries, and ethnic-groups, which makes it hard to study the HAI, HPI ratio by using national or regional medium income. In the next section, HPI housing affordability is examined in three parts to answer these questions:

Housing affordability among different cities (regions);
Do regions with higher GDP per capita suffering less or more from housing affordability issue?

Housing affordability changes from 1994 to 2007 (Beijing);
Is housing getting more affordable or less affordable after the privatization?

Housing affordability among different housing market segmentations;
Which income class faces more difficulties to afford housing?

4.2.2 Housing affordability among different cities

Geographically, China consists of three big regions - east, west and middle. ‘East’ cities are most developed economies, ‘middle’ cities are developing quite fast, and ‘west’ cities are less developed. In order to answer the question: ‘Do regions with higher GDP per capita suffer less from housing affordability problem, or more?’ 25 cities (provincial capital cities) from east, west and middle regions are selected and housing affordability of these cities are studied by average annual income/house price ratio.

Housing affordability is studied by calculating HPI ratio, since the standard house size varies across cities (eg: Beijing is 60 sq.m and Shanghai is 90 sq.m), here I use average annual income
divided by average house price per square meter to study how many sq.m can be purchased by one-year income in the sample cities.

From Table 2, we observe that, citizens in economically developed areas and cities in China have more difficulties to afford houses. In Shanghai, one year income is only sufficient to buy 1.56 sq.m, which means that it takes around 90 years of saving with no expenditure to buy a typical 90 sq.m apartment in Shanghai. Beijing is slightly better than Shanghai, the purchasing power of one-year Beijing income is 1.66 sq.m. In cities in ‘middle’ like Chongqing (3.27) and Chengdu 2.94, it is easier to afford a house. In less developed cities like Yinchuan (5.70) and Karamay (5.19) houses are more affordable compared to ‘east’ and ‘middle’ cities.

**Table 2: Housing affordability study of 25 Chinese cities**

<table>
<thead>
<tr>
<th>city</th>
<th>province</th>
<th>Average Annual income per capita (Yuan)</th>
<th>Average house price per square meter (Yuan)</th>
<th>Average annual income/house price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yinchuan</td>
<td>Ningxia</td>
<td>6,790</td>
<td>1,191</td>
<td>5.70</td>
</tr>
<tr>
<td>Luoyang</td>
<td>Henan</td>
<td>6,920</td>
<td>1,313</td>
<td>5.27</td>
</tr>
<tr>
<td>Karamay</td>
<td>Xinjiang</td>
<td>6,029</td>
<td>1,161</td>
<td>5.19</td>
</tr>
<tr>
<td>Nanchang</td>
<td>Jiangxi</td>
<td>7,540</td>
<td>1,499</td>
<td>5.03</td>
</tr>
<tr>
<td>Shijiazhuang</td>
<td>Hebei</td>
<td>9,670</td>
<td>2,097</td>
<td>4.61</td>
</tr>
<tr>
<td>Nanning</td>
<td>Guangxi</td>
<td>9,200</td>
<td>2,017</td>
<td>4.31</td>
</tr>
<tr>
<td>Dongwan</td>
<td>Guangdong</td>
<td>27,025</td>
<td>6,608</td>
<td>4.10</td>
</tr>
<tr>
<td>Foshan</td>
<td>Guangdong</td>
<td>21,234</td>
<td>5,319</td>
<td>3.99</td>
</tr>
<tr>
<td>Shenyang</td>
<td>Liaoning</td>
<td>17,295</td>
<td>4,700</td>
<td>3.68</td>
</tr>
<tr>
<td>Guangzhou</td>
<td>Guangdong</td>
<td>25,317</td>
<td>7,600</td>
<td>3.33</td>
</tr>
<tr>
<td>Xi’an</td>
<td>Shanxi</td>
<td>15,207</td>
<td>4,600</td>
<td>3.31</td>
</tr>
<tr>
<td>Chongqing</td>
<td>Chongqing</td>
<td>14,368</td>
<td>4,400</td>
<td>3.27</td>
</tr>
<tr>
<td>Wuhan</td>
<td>Hubei</td>
<td>16,712</td>
<td>5,200</td>
<td>3.21</td>
</tr>
<tr>
<td>Suzhou</td>
<td>Jiangsu</td>
<td>23,860</td>
<td>7,600</td>
<td>3.14</td>
</tr>
<tr>
<td>Wuxi</td>
<td>Jiangsu</td>
<td>20,898</td>
<td>7,112</td>
<td>2.94</td>
</tr>
<tr>
<td>Chengdu</td>
<td>Sichuan</td>
<td>16,934</td>
<td>6,300</td>
<td>2.70</td>
</tr>
<tr>
<td>Zhuhai</td>
<td>Guangdong</td>
<td>19,290</td>
<td>7,710</td>
<td>2.50</td>
</tr>
<tr>
<td>Xiamen</td>
<td>Fujian</td>
<td>21,290</td>
<td>8,519</td>
<td>2.50</td>
</tr>
<tr>
<td>Nanjin</td>
<td>Jiangsu</td>
<td>23,122</td>
<td>9,600</td>
<td>2.41</td>
</tr>
<tr>
<td>Shenzhen</td>
<td>Guangzhou</td>
<td>26,769</td>
<td>11,160</td>
<td>2.30</td>
</tr>
<tr>
<td>Tianjin</td>
<td>Tianjin</td>
<td>19,423</td>
<td>8,700</td>
<td>2.23</td>
</tr>
<tr>
<td>Beijing</td>
<td>Beijing</td>
<td>24,725</td>
<td>14,900</td>
<td>1.66</td>
</tr>
<tr>
<td>Hanzhou</td>
<td>Zhejiang</td>
<td>24,104</td>
<td>15,200</td>
<td>1.59</td>
</tr>
<tr>
<td>Shanghai</td>
<td>Shanghai</td>
<td>26,675</td>
<td>17,100</td>
<td>1.56</td>
</tr>
<tr>
<td>Wenzhou</td>
<td>Fujian</td>
<td>24,002</td>
<td>17,116</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Sources: Based on data from the National statistical bureau of the cities listed, as well as house price data from Global property guide 2008.

**4.2.3 HPI ratio of Beijing from 1994 to 2007**

Housing privatization was designed to introduce market mechanism into the housing market, and making house affordable for majority of people of different income classes is the goal for policy makers. Now three decades after the privatization, is housing getting more or less affordable?
The equation is: \( \text{HPI ratio} = \frac{\text{AP} \times \text{FA}}{\text{AY} \times \text{nP}} \)

Table 3: HPI ratio of Peking from 1992 to 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>AY (Yuan)</th>
<th>nP</th>
<th>AY*nP (Yuan)</th>
<th>AP (Yuan/ m²)</th>
<th>AP*FA Selling price of a 60 square meter house(Yuan)</th>
<th>HPI ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>11,659</td>
<td>3.00</td>
<td>34,977.0</td>
<td>4,716</td>
<td>282,960</td>
<td>8.09</td>
</tr>
<tr>
<td>2000</td>
<td>10,416</td>
<td>3.10</td>
<td>32,290.8</td>
<td>4,557</td>
<td>273,420</td>
<td>8.47</td>
</tr>
<tr>
<td>1999</td>
<td>9,239</td>
<td>3.10</td>
<td>28,640.3</td>
<td>4,787</td>
<td>287,220</td>
<td>10.03</td>
</tr>
<tr>
<td>1998</td>
<td>8,521</td>
<td>3.00</td>
<td>25,561.8</td>
<td>4,769</td>
<td>286,140</td>
<td>11.19</td>
</tr>
<tr>
<td>1997</td>
<td>7,862</td>
<td>3.06</td>
<td>24,056.8</td>
<td>5,337</td>
<td>320,220</td>
<td>13.31</td>
</tr>
<tr>
<td>1996</td>
<td>7,339</td>
<td>3.06</td>
<td>22,456.7</td>
<td>4,057</td>
<td>243,420</td>
<td>10.84</td>
</tr>
<tr>
<td>1995</td>
<td>6,238</td>
<td>3.13</td>
<td>19,524.6</td>
<td>3,227</td>
<td>193,620</td>
<td>9.92</td>
</tr>
<tr>
<td>1994</td>
<td>5,086</td>
<td>3.17</td>
<td>16,122.6</td>
<td>2,740</td>
<td>164,400</td>
<td>10.20</td>
</tr>
<tr>
<td>1993</td>
<td>3,548</td>
<td>3.21</td>
<td>11,388.5</td>
<td>2,255</td>
<td>135,300</td>
<td>11.88</td>
</tr>
<tr>
<td>1992</td>
<td>2,557</td>
<td>3.25</td>
<td>8,303.6</td>
<td>1,613</td>
<td>96,780</td>
<td>11.65</td>
</tr>
</tbody>
</table>


The Chinese housing privatization started in the 1980’s and was applied national wide in 1998. Table 3 studies the HPI ratio of Beijing during 10 years’ period in the process of housing privatization from 1992 to 2001.

In Table 3, generally, we can see a gradual decrease of HPI ratio from 1992 to 2001. In 1995, the HPI ratio in Beijing hit the record low 9.92 since 1992 due to the major increase in salary. In 1996, the HPI increased to 10.84 from 9.92 in 1995, it shows that the increase of salary could not match the fast increase of housing price.

The Beijing HPI ratio slightly rose in the beginning of the period and then fell from 10.20 to 9.92 between 1994 and 1995, mainly as a result of rapidly rising incomes. Even though the average annual per capita income continued to experience quite substantial increases in both 1996 and 1997, the price of residential buildings rose even faster. As a result, the HPI ratio increased again and reached a peak of 13.31 in 1997. Then a decreasing trend started. In 2001, it dropped to 8.09, the lowest for the ten-year period under study. Note that the Asian Financial Crisis struck in 1997. Although the Chinese economy managed to remain more or less intact, residential prices in Beijing nonetheless fell by more than 10% between 1997 and 1998. In 1998, House Provident fund (discussed in the following part) was introduced to help people afford their house. As a result, residential prices stayed at relatively low levels between 1999 and 2001, despite continual rapid income increases (Lau).

In this section, data from the municipal statistic bureau in Beijing was used to answer the question - If housing is getting more or less affordable after the privatization. In Beijing, we observe that the gradually decreasing index of HPI from 1992 to 2001, the housing purchasing power of family incomes decreasing during these 10 years. The figures indicated that housing was beyond affordability according to international convention (HPI ratio around 3 to 5 is defined as affordable by international standard).
4.2.4 HPI ratio of Shanghai

Instead of using the data from Municipal Statistics Bureau, data from Fudan University is used to study the HPI ratio in Shanghai, which results in huge differences compared to the study using data from the Municipal Statistic Bureau of Beijing.

HPI ratio based on data from Fudan University

Between 1995 and 2005, the mean housing price in Shanghai increased 270%. This is undoubtedly a very astonishing figure by any standard. However, it becomes more acceptable if one notes that the accumulated nominal increase of disposable income per capita during the same period was 260%. Even after accounting for inflation, the accumulated increase of real disposable income per capital during this period was 214%. The housing price was increasing 1.26 times faster than the income during these 20 years (Chen, 2006).

Using the same price to income ratio method, HPI ratio is total purchase price of a typical house divided by annual family disposable income. Considering the income distribution, Table 4 studies the affordability based on eight income categories and for each year throughout 1995-2005 in Shanghai - A typical house in this study is defined as a 90 sq.m construction-size house.

Table 4: HPI ratio of Shanghai from 1995 to 2005 based on Fudan University data

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Bottom</th>
<th>10-20%</th>
<th>20-40%</th>
<th>40-60%</th>
<th>60-80%</th>
<th>80-%</th>
<th>Top 10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>10.73</td>
<td>22.36</td>
<td>17.40</td>
<td>14.71</td>
<td>11.90</td>
<td>9.68</td>
<td>8.04</td>
<td>5.73</td>
</tr>
<tr>
<td>1997</td>
<td>10.01</td>
<td>21.26</td>
<td>16.15</td>
<td>13.39</td>
<td>10.92</td>
<td>8.98</td>
<td>7.33</td>
<td>5.45</td>
</tr>
<tr>
<td>1998</td>
<td>10.05</td>
<td>21.88</td>
<td>16.14</td>
<td>13.47</td>
<td>11.16</td>
<td>9.08</td>
<td>7.49</td>
<td>5.52</td>
</tr>
<tr>
<td>1999</td>
<td>8.29</td>
<td>15.72</td>
<td>12.96</td>
<td>11.48</td>
<td>9.01</td>
<td>7.72</td>
<td>6.28</td>
<td>3.96</td>
</tr>
<tr>
<td>2000</td>
<td>8.40</td>
<td>14.84</td>
<td>13.76</td>
<td>10.88</td>
<td>9.29</td>
<td>7.64</td>
<td>6.29</td>
<td>4.33</td>
</tr>
<tr>
<td>2001</td>
<td>8.52</td>
<td>16.50</td>
<td>14.06</td>
<td>12.60</td>
<td>10.04</td>
<td>7.79</td>
<td>6.23</td>
<td>3.75</td>
</tr>
<tr>
<td>2003</td>
<td>10.10</td>
<td>24.02</td>
<td>19.16</td>
<td>15.99</td>
<td>11.72</td>
<td>9.30</td>
<td>7.06</td>
<td>4.34</td>
</tr>
<tr>
<td>2004</td>
<td>11.33</td>
<td>24.80</td>
<td>17.90</td>
<td>13.32</td>
<td>9.89</td>
<td>5.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>10.78</td>
<td>24.80</td>
<td>17.90</td>
<td>13.32</td>
<td>9.89</td>
<td>5.84</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


From Table 4 we observe that, in 2004, a Shanghai family typically needs to wait more than 11 year after continuously saving all of their yearly family incomes before they are able to purchase a new home. For low-income families that are at the bottom 20% income group, they need at least 25 years life without any consumption to purchase a house (with no other financial aids).

More than half of the households in Shanghai could not afford buying a home with their annual family earnings within 15 years. This table also suggests that the market situation of the bottom 60% income group significantly deteriorated during the period of 1995-2005. However, the top 20% rich Shanghai households maintain their housing purchasing power. The top 10% rich household even managed to improve their affordability as a homeowner.
Answering the research question - which income class faces more difficulties to afford housing, we find that according to the figures from Fudan University, affordability of top income class in Shanghai has been improved. The affordability of middle-income class hasn’t changed much and they still face serious challenges (HPI 17.9 and 13.32, which are way beyond the 3 which is regarded as affordable). Finally, affordability of low-income class has been decreasing after the housing privatization in Shanghai.

**HPI ratio based on data from municipal statistics bureau**

**Table 5: Comparing the HPI ratio of Beijing, Shanghai and Guangzhou, 2001**

<table>
<thead>
<tr>
<th>City</th>
<th>Income Per Capita (yuan)</th>
<th>Average Number of Persons</th>
<th>Household Income (yuan)</th>
<th>Average Price (yuan / m²)</th>
<th>Selling Price (60 m²) (yuan)</th>
<th>PIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai</td>
<td>12,982</td>
<td>3.12</td>
<td>40,504</td>
<td>3,659</td>
<td>219,540</td>
<td>5.42</td>
</tr>
<tr>
<td>Guangzhou</td>
<td>14,965</td>
<td>3.29</td>
<td>49,235</td>
<td>4,837</td>
<td>290,220</td>
<td>5.89</td>
</tr>
<tr>
<td>Beijing</td>
<td>11,659</td>
<td>3.00</td>
<td>34,977</td>
<td>4,716</td>
<td>282,960</td>
<td>8.09</td>
</tr>
</tbody>
</table>


Based on different data resources, the HPI ratio presents big differences. According to Table 5, the HPI ratio of Shanghai is only 5.42 (using data from Municipal Statistic Bureau) which make housing not extremely unaffordable for most households. Data from Fudan University indicated the HPI ratio is 8.52 on average (Table 4), which indicates affordability more problematic in Shanghai according to this data source.

Investigating the housing affordability simply by using HAI and HPI index would be misleading. Housing affordability is not simply a ratio which can define; using the ratio approach to study ‘affordability’ is complicated by different sources of data, and distribution of income among different income groups and cities. In the next sections, eight factors of social and policy complications will be studied.
5. Related housing policies

One important reform and two policies regarding urban housing affordability are discussed in the following section: housing privatizing, housing provident fund, and social housing (affordable housing).

5.1 Housing privatizing

5.1.1 Development of the Chinese housing privatization policy

Since the early 1980’s, China has maintained two different housing systems - Private housing and Public housing. The Chinese government established the public housing system in the early 1950’s. In this system, the government, government organizations, or state-owned enterprises directly own and allocate housing to their employees (Buttimer, 2004). In the private housing system, individuals privately own housing and trade it within a free market. For the next two decades after the introduction of private housing, the Chinese government has implemented a series of policies designed to privatize government owned housing. Until 1998, no public house was allowed to be allocated national wide (Duda & Zhang, 2005).

Unlike most of the capitalism countries, before 1998, most of the urban houses are state owned. People who work for SOEs (state own enterprises) or government organizations would allocate a house from the businesses they work for at very low cost-the rent that the Chinese government charges for public housing has been below the cost to maintain the property, much less than a market rental rate. A key difference between formerly planned and market economies is the shift to which individuals are responsible for their own housing.

During the transition from plan economy to market economy, housing privatization has become a dominant theme in politics and policy in socialist countries (Linneman & Megbolugbe, 1994). Policymakers believe that the housing problems can be better resolved by introducing the market mechanism, reducing the government’s intervention, and housing subsidies. China’s housing policy is home ownership leading, house privatization policy is a big step forward to support homeownership. The homeownership rate of China was 80% in 2010, which was relatively high from the study of international homeownership study of 19 countries. From the study, the average homeownership rate is 64% (Barth, Lea &d Li, 2012).

There were no affordability issues for people who work for SOEs (state own enterprises) or government before the housing privatization, because the rent was quite low. One figure indicating that as of 1991 rent on government-owned housing averaged 0.13 ¥/m² (USD 0.02/m² which corresponds to SEK 0.14/m²) of living space (enterprise-owned housing was even cheaper) while maintenance expenses averaged 2.31¥ /m² (USD 0.34/m², SEK 2.53/m²). Under these conditions housing costs accounted for only 1 percent of the average worker’s earnings (Duda & Zhang, 2005).

In Shenyang (an important industry city in north China), rents were 0.15 Yuan per square meter in the 1980’s, and increased to 1.98 Yuan per square meter in 1997. The Beijing rent was 3.05 Yuan per square meter in 1997, but, cash subsidies was offered by most employers ranging from 100 Yuan to 150 Yuan a month, so the monthly cost of renting a public house was just less than 100 Yuan for a household - a typical 60 square meter house (Ding, 2003).
5.1.2 Influence of the housing privatization

Housing is a very scarce recourse in any economy. Its access is highly unequal as some socialist countries like China, before the privatization, housing authorities could use housing to reward politically loyal and disciplined workers (Yong, 2002). For others, who do not work for SOEs or government, houses have to be purchased on their own at the market price.

Effect of the privatization on the population

Before the privatization, households who had access to public housing could benefit from the low renting cost. After the privatization, they were offered to buy the ownership of the former public houses at a low cost (or with subsidies). Affordability was not an issue for these households back then, but the question is, how many Chinese households were benefiting from public housing before and after the privatization in 1998? Table 6 presents the structure of employment of China in the duration of 7 years of housing privatization, and 3 years after it.

Table 6: The structure of employment of China from 1993 to 2001

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SOEs</td>
<td>67.7%</td>
<td>66.4%</td>
<td>67.4%</td>
<td>67.2%</td>
<td>66.8%</td>
<td>65.2%</td>
<td>63.2%</td>
<td>59.4%</td>
<td>58.3%</td>
</tr>
<tr>
<td>Collective Units</td>
<td>13.1%</td>
<td>11.3%</td>
<td>10.3%</td>
<td>10.6%</td>
<td>10.3%</td>
<td>9.6%</td>
<td>10.0%</td>
<td>8.0%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Other types of units (including private)</td>
<td>0.5%</td>
<td>1.4%</td>
<td>1.3%</td>
<td>1.2%</td>
<td>1.8%</td>
<td>3.2%</td>
<td>3.0%</td>
<td>3.8%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Entrepreneurs</td>
<td>0.4%</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.7%</td>
<td>1.0%</td>
<td>1.3%</td>
<td>1.6%</td>
<td>2.6%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Employees of individuals</td>
<td>0.3%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.4%</td>
<td>1.1%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Re-employed</td>
<td>3.3%</td>
<td>3.6%</td>
<td>3.4%</td>
<td>3.3%</td>
<td>2.9%</td>
<td>3.0%</td>
<td>3.4%</td>
<td>2.6%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Other employed</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.2%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Retirees and others</td>
<td>14.6%</td>
<td>16.5%</td>
<td>16.6%</td>
<td>16.6%</td>
<td>16.8%</td>
<td>18.2%</td>
<td>18.0%</td>
<td>22.0%</td>
<td>21.9%</td>
</tr>
</tbody>
</table>

Sources: Cao (2004), From Federalism, Chinese Style, to Privatization.

From Table 6, in 1998 (the last year of public housing), there was at least 74.8% (65.2% SOEs and 9.6% Collective Units) of all Chinese employee could benefit from public housing, and housing affordability wasn’t problematic for the majority. From 1998, SOE and Collective units’ employee can either purchase the ownership of the house which they used to rent at a very affordable price, which is much lower than the market price, or sell the house to fund a new commercial apartment.

According to ‘China labor force report’ (Chinese Academy of Personnel Science, 2006), in 1996, there were 109 million people working for SOEs and Collective units. In 2001, they were only 74 million. The number is decreasing at around 5% annually. For the nine years before and after the housing privatization, there was a gradually drop in the percentage of employee who could access to cheap renting houses (from 80.8% to 65.6%). More households have to leave the public housing system and face the challenges in the commercial housing market.

Effect of the privatization on the housing market

The housing privatization reform has led to some significant changes in housing market. On the production side, SOEs and Collective units has withdrawn from direct involvement in housing construction (Figure 8). The percentage of public housing construction almost halved from 1981
to 1998 to 42%. Commercial housing sales increased more than 4 times (from 2,000 million sq.m to about 11,000 million sq.m) during the privatization (Figure 9).

**Figure 8: Proportion of total floor space constructed by SOEs and collective units. 1981 to 1998**

![Proportion of total floor space constructed by SOEs and collective units. 1981 to 1998](image)


**Figure 9: Total floor space sold commercial housing, 1987 to 1998**

![Total floor space sold commercial housing, 1987 to 1998](image)


5.1.3 Large number of lay-off from SOE in 1990’s

Although more than half of Chinese employees benefited from the public housing and housing privatization, the large lay-off from SOE in 1990’s made millions of former SOE employees struggling for a job, not to mention affording a house.

In the 1990s, national wide privatization left many lay-offs and widespread job insecurity in many SOEs. According to the National statistical bureau 1996, 7.5 million SOE workers were laid off during the reform - 75% of them only have high school diploma and 56.5% of them aged between 35 and 45. In other words, it is not only people's propensity to save for home ownership, but also their ability to find stable employment - and income security in a changing economy which posed a challenge to housing reforms.

Until 1998, 65.2% Chinese employees (98 million workers) were offered to buy the ownership of the former public houses with no or little affordability issue. During the 1990’s national wide lay-offs, millions of people lost their job. This posed a challenge for both the job market and house market. In 2010, it has been 12 years since the last year of public housing, house price increased 4 to 5 times in major cities since then, while the value of former public houses are not increasing proportionally due to the poor quality and aged equipment, so demand for new and better houses was increasing among households who live in former public houses (Zenou, 2010).
To answer the research question: **how many Chinese households could benefit from public housing before and after housing privatization.** Before the privatization, more than half of city residences were benefiting from public housing. After privatization, with the national wide SOEs lay-offs and dramatic house price increasing, public housing is only satisfying minorities.

**Government regulations and practices impact on house affordability**

To bridge the gap between people's income and the price for housing, the Chinese government has introduced a series of policies aimed at both the supply side and the demand side of housing provision. On the supply side, since 1998, one policy was introduced that about 5% of urban low income families would rent social housing from municipal government. However, this social housing was developed very slowly, and by 2003, only few provinces had produced local regulations for social housing. On the demand side, subsidized rental housing was seen by many local officials as a temporary measure to solve a short-run problem. However, with increasing unemployment and lack of social insurance, poverty became an issue and the number of households who need help was increasing rather than decreasing, in practice a large fraction of migrant workers have no ‘hukou’4 (Zenou, 2010).

Learning from the disadvantages of the previous discussed housing policies, there are two successful homeownership oriented housing policies that I will discuss in this thesis: on the demand side – the ‘Housing Provident Fund’ - compulsory savings scheme; on the supply side - ‘Social housing’ (or Affordable housing from direct Chinese translation). The Housing Provident fund is designed to assist middle and lower-middle income workers to finance the house. ‘Social housing’ (affordable housing) is aiming to help lower-income households purchasing basic dwellings with very limited profit.

5.2 The HPF (housing provident fund)

5.2.1 The collection of HPF fund

When an employee registers for an HPF, his or her employer opens a special account for him or her in a state-owned bank. The employee must contribute around 5% to 12% of his/her monthly salary, which is matched by the employer. The employee only uses the funds to purchase residential property, for which he is entitled to below market-rate loans from state-owned banks.

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4 Hu kou: A Chinese household registration record officially identifies a person as a resident of an area.
Should the employee die, their funds become part of their estate. Once in the program, however, the employee must continue their monthly contributions to their HPF account until they retire, pass away, or are separated from their employer (Beijing House provident fund authority 2008). An estimated 80 million workers were in the program by 2004, and had saved CNY630 billion⁵ (Global property guide, 2009).

The Housing Provident Fund is one tool that the Chinese government has developed in its efforts to privatize housing that has previously been publicly owned. The program has had some success over the past decade in assisting in the privatization of the Chinese urban housing stock.

HPF participation rates seem to be highest in large cities, such as Beijing, Tianjin and Shanghai (98%), and in some cities located in wealthy provinces such as Jiangsu and Zhejiang (90%), but in most cities the policy coverage is less than 50% (Chen, 2008).

### 5.2.2 The effects of HPF in major Chinese cities

HPF is managed by the local government and each city has their own regulations on the percentage of the HPF to monthly salary, and the upper limit of the individual fund. In this thesis, I study the percentage, monthly upper limit of the HPF and the average monthly income of some major cities.

**Table 7: Salary based HPF in 7 cities**

<table>
<thead>
<tr>
<th>City</th>
<th>HPF to monthly salary ratio(Mean, Lower and upper limit)</th>
<th>Average monthly salary</th>
<th>Average HPF per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing</td>
<td>12% (6% to 18%)</td>
<td>2,061 Yuan</td>
<td>247.3 Yuan</td>
</tr>
<tr>
<td>Shanghai</td>
<td>7% (4% to 10%)</td>
<td>2,223 Yuan</td>
<td>115.6 Yuan</td>
</tr>
<tr>
<td>Chengdu</td>
<td>8% (5% to 11%)</td>
<td>1,411 Yuan</td>
<td>112.9 Yuan</td>
</tr>
<tr>
<td>Hangzhou</td>
<td>10% (6% to 14%)</td>
<td>2,009 Yuan</td>
<td>200.9 Yuan</td>
</tr>
<tr>
<td>Tianjin</td>
<td>9.5% (5% to 14%)</td>
<td>1,619 Yuan</td>
<td>153.8 Yuan</td>
</tr>
<tr>
<td>Shenzhen</td>
<td>8.5% (5% to 12%)</td>
<td>2,231 Yuan</td>
<td>189.6 Yuan</td>
</tr>
<tr>
<td>Chongqing</td>
<td>9.5% (7% to 12%)</td>
<td>1,197 Yuan</td>
<td>113.8 Yuan</td>
</tr>
</tbody>
</table>

Source: calculated based on the local municipal housing provident fund authority and municipal statistic bureau of the cities listed. (HPF ratio of the above cities are collected from bjgjj.gov.cn, ssqjj.gov.cn, cdzfgjj.gov.cn, hzgjj.gov.cn, zgjj.cn, sygjj.gov.cn, cqqjj.gov.cn) Note: the average HPF to monthly salary ratio is calculated by the median number of the lowest ratio and highest ratio.

Cities with higher GDP per capita like Beijing and Shanghai subsidize more HPF to employees than other cities. On average, an urban employee could receive around 200 Yuan (USD 29.2 or SEK 218.7) per month (or 2,400 Yuan per year) for funding their purchase of house, which to some degree, could relief the pressure of rocket high house price to the average households.

### 5.2.3 Social issues of HPF

HPF’s social equity aspects also received harsh criticism. It was argued that, since the HPF system is employment and income based, it may have discriminatory effects on low-income and temporary employees, workers in the small businesses and unemployed population. There was

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⁵ CNY630 billion is (USD 76 billion or SEK 569 billion)
also a viewpoint that the upper income level groups benefit more from the HPF scheme than the medium and low income groups (Buttimer, Gu &d Yang, 2004).

To some extent, HPF contributes to the inequality in the housing market. Table 8 shows the distribution of HPF subsidies in Guangzhou in 1998. The bottom rank employee receive house subsidy that is only 25% of what the top ranked employee-mayor receive. The figure of Guangzhou city shows that, the HPF subsidies benefiting middle and high income class much more than low-income class. It makes it easier to afford a house for rich and accelerates the inequality.

**Table 8: Distribution of house subsidies in Guangzhou, 1998**

<table>
<thead>
<tr>
<th>Rank by position</th>
<th>Monthly subsidy (Yuan per person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerk</td>
<td>233</td>
</tr>
<tr>
<td>Executive officer</td>
<td>280</td>
</tr>
<tr>
<td>Deputy section head</td>
<td>327</td>
</tr>
<tr>
<td>Section head</td>
<td>373</td>
</tr>
<tr>
<td>Deputy Dept. head</td>
<td>420</td>
</tr>
<tr>
<td>Dept. head</td>
<td>467</td>
</tr>
<tr>
<td>Deputy Bureau Director</td>
<td>543</td>
</tr>
<tr>
<td>Bureau Director</td>
<td>607</td>
</tr>
<tr>
<td>Deputy mayor</td>
<td>747</td>
</tr>
<tr>
<td>Mayor</td>
<td>933</td>
</tr>
</tbody>
</table>


HPF is employment-based and it has no effect at all on the many households who are unemployed, marginally employed and self-employed. This is reinforced by the fact that even most working lower-income households are not in the kind of official, full-time, and typically public sector positions likely to carry an HPF benefit (Duda & Zhang, 2005). Furthermore, because employer matching takes the form of a percentage of income, higher-income households receive a larger benefit, so it accelerates the inequality in the housing market.

**5.3 Social housing (ownership based, not renting public housing)**

As mentioned earlier in the 3.4, the limitation of HPF (benefiting more middle and high income classes) could be compensated by Social housing (affordable housing) system to some degree.

**5.3.1 The purchase of Social houses**

One of the major differences between commercial house and social housing in China is that buying social housing requires application and approval from local authority. Social houses are not allowed to be sold in the secondary market, while commercial housing can be bought and sold freely in the market.

According to the purchase regulation of social housing in Beijing in 2010, buying social housing requires households to be local residents (Hukou restriction); family housing area less than 15 square meters; annually family income less than 45,300 Yuan (household with 3 working
people). It must be approved by community and the employer of the applicants, and then publish the application on the official website of Beijing housing authority (Beijing municipal commission of housing.).

Beneficiary of Social housing – Case study of Peking

Due to the data availability, Beijing is chosen to study the effects of social housing system. According to the Beijing Municipal Bureau of Statistics the mean annual household income of lower-middle-income class (the target group for the policy) in Beijing in 2002 was 29,966 Yuan (USD 4,392 or SEK 32,896).

In Beijing, 1998 saw the approval of the first set of affordable housing consisting of 19 projects containing 70,000 units with a total of 5.6 million square meters of floor space. Most affordable houses are located in suburban areas, at least in part to reduce the cost of compensating existing land users. Prices ranged from 2,000 to 4,000 ¥/m². Wang (2004) claim that an apparent drop in Beijing house prices in 2002 was due largely to the opening of sales for three large affordable housing communities with a total of more than 2 million m² of living space priced between 2,200 and 2,650 ¥/m².

Table 9: Beijing housing market Characteristics, 2003

<table>
<thead>
<tr>
<th>Unit type</th>
<th>Units sold</th>
<th>Floor space (Million sq m)</th>
<th>Value (Billion Yuan)</th>
<th>Average Price (Yuan/square meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordable housing</td>
<td>33,797</td>
<td>3.9</td>
<td>11.5</td>
<td>2,918</td>
</tr>
<tr>
<td>Commercial housing</td>
<td>114,003</td>
<td>13.5</td>
<td>86.4</td>
<td>6,396</td>
</tr>
</tbody>
</table>


Table 9 presents that commercial housing dominated Beijing house market in 2003, accounting for more than three times as many sales valued at 7.5 times that of other pre-sold units. The higher aggregate value of commercial housing is partially a function of the subsidy, which makes the affordable units less than half as expensive on the basis of cost per square commercial housing. Taking Beijing as an example, affordable housing contributed to helping affordability in some degree, but the question is who is actually benefiting from Social housing most?

5.3.2 Is Social housing really affordable?

Affordable housing is designed to relief the affordability issues of low and lower-middle income classes, but is it working perfect for them? There are some affordable housing issues frequently addressed by some Chinese scholars and Medias as follows: increasing house vacancy rate in affordable housing communities; difficult to buy affordable houses, and complicated procures to buy due to the off the book selling/buying.; affordable housing communities locate suburbs, which make transportation, education and healthcare more difficult for lower or middle income families, and accelerating inequality; black market trading affordable housing regardless the policy (Wu, 2004).

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Table 10 presents results based on the study by Duda and Zhang (2005) for Beijing. In their study they use a sample of 683 households. The result shows that for the low income classes, their basic expenses would exceed their income by 595 Yuan (USD 86.9 or SEK 650.6) a month even if they purchase social housing. From a home purchasing perspective, it implied that the ability of lower-middle and middle-income households to save for the down payment necessary to purchase a home with mortgage loan is minimal, because social housing is not affordable enough for all the targeted income classes.

Table 10: Income and expenses among different Peking income classes 2005

<table>
<thead>
<tr>
<th>Household Income Class</th>
<th>Average Household Income</th>
<th>Expenses</th>
<th>Household Size</th>
<th>Employees Per Household</th>
<th>Retired Persons per Household</th>
<th>Sample Size (households)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>15,651</td>
<td>16,245</td>
<td>2.9</td>
<td>1.3</td>
<td>0.72</td>
<td>295</td>
</tr>
<tr>
<td>Lower-Middle</td>
<td>29,981</td>
<td>26,493</td>
<td>3.0</td>
<td>1.5</td>
<td>0.90</td>
<td>93</td>
</tr>
<tr>
<td>Middle</td>
<td>37,226</td>
<td>31,114</td>
<td>3.2</td>
<td>1.3</td>
<td>0.93</td>
<td>86</td>
</tr>
<tr>
<td>Upper-Middle</td>
<td>47,620</td>
<td>44,453</td>
<td>3.2</td>
<td>1.8</td>
<td>0.91</td>
<td>80</td>
</tr>
<tr>
<td>Upper</td>
<td>89,233</td>
<td>72,127</td>
<td>3.3</td>
<td>1.9</td>
<td>0.91</td>
<td>129</td>
</tr>
<tr>
<td>Total</td>
<td>37,961</td>
<td>34,435</td>
<td>3.1</td>
<td>1.6</td>
<td>0.93</td>
<td>683</td>
</tr>
<tr>
<td>Weighted Total</td>
<td>43,942</td>
<td>38,087</td>
<td>3.1</td>
<td>1.6</td>
<td>0.88</td>
<td>683</td>
</tr>
</tbody>
</table>

Source: Duda & Zhang (2005), Two Programs using Survey Data from Beijing, p.20.

Duda and Zhang’s (2005) present the cost for the Social housing program. All values in Tables 10 and 11 are based on the purchase of a 70 square meter dwelling. Owners are assumed to purchase the units with a 20 or 30 year mortgage at either the special social housing interest rate of 4.05 percent or the market rate of 5.04 percent, and to make a 20 percent down payment. Over that period, social housing units cost roughly half as much per square meter (¥ 3,202) as market rate housing (¥ 6,206), indicating the substantial impact on carrying costs made by the subsidy and profit caps.

Table 10 and Table 11 show that even with social housing policy, many lower-middle- and middle-income households will still face significant problems purchasing an affordable home. Data indicate that survey respondents in low income class with annual income ¥15,651, excluding the 20% down payment saving cost, it takes 66% of annual family income to pay the 30 year loan, and 83.6% of family income to pay the 20 years loan at the affordable interest tare 4.05%, while for lower-middle-income class with annual income of ¥29,981, 30 year loan annual payment accounts for 24.5% of family annual income, and 20 year loan accounts for 43.7% of family annual income, if they purchase an affordable unit at the lowest price ¥ 3,202 per square meter at interest rate 4.05%.
Table 1: Monthly and annual mortgage payments on a typical unit in Beijing

<table>
<thead>
<tr>
<th></th>
<th>Price per square meter</th>
<th>Total Price ($V)</th>
<th>Amount Borrowed ($#)</th>
<th>Monthly Payment ($#)</th>
<th>Annual Payment ($#)</th>
<th>Monthly Payment ($#)</th>
<th>Annual Payment ($#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordable Int. Rate: 4.05%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affordable Unit: ¥3,202</td>
<td>224,140</td>
<td>179,312</td>
<td>861</td>
<td>10,335</td>
<td>1.091</td>
<td>13.096</td>
<td></td>
</tr>
<tr>
<td>¥4,500</td>
<td>315,000</td>
<td>252,000</td>
<td>1,210</td>
<td>14,524</td>
<td>1.534</td>
<td>18.405</td>
<td></td>
</tr>
<tr>
<td>¥5,500</td>
<td>385,000</td>
<td>308,000</td>
<td>1,479</td>
<td>17,752</td>
<td>1.875</td>
<td>22.494</td>
<td></td>
</tr>
<tr>
<td>Commercial Unit: ¥6,253</td>
<td>437,710</td>
<td>350,168</td>
<td>1,682</td>
<td>20,162</td>
<td>2.131</td>
<td>25.574</td>
<td></td>
</tr>
<tr>
<td>Market Int. Rate: 5.04%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affordable Unit: ¥3,202</td>
<td>224,140</td>
<td>179,312</td>
<td>967</td>
<td>11,604</td>
<td>1.187</td>
<td>14.248</td>
<td></td>
</tr>
<tr>
<td>¥4,500</td>
<td>315,000</td>
<td>252,000</td>
<td>1,359</td>
<td>16,308</td>
<td>1.474</td>
<td>17.688</td>
<td></td>
</tr>
<tr>
<td>¥5,500</td>
<td>385,000</td>
<td>308,000</td>
<td>1,661</td>
<td>19,932</td>
<td>1.802</td>
<td>21.624</td>
<td></td>
</tr>
<tr>
<td>Commercial Unit: ¥6,253</td>
<td>437,710</td>
<td>350,168</td>
<td>1,888</td>
<td>22,656</td>
<td>2.049</td>
<td>24.588</td>
<td></td>
</tr>
</tbody>
</table>

Source: Duda & Zhang (2005), Two Programs using Survey Data from Beijing, p. 20.

Obviously, according to the study, both a 30 year loan and a 20 year loan at affordable interest rate are beyond the affordability of low-income-class in Beijing. The affordable housing system only works for low-middle income class and above, which leave people who most need affordable houses (low income class) outside of the system.

5.4 Tax

Chinese personal tax is generally lower than in the most developing and developed countries, so it plays a positive effect on the Chinese housing affordability issues. Taxes related to housing purchasing are investigated in this paper by a comparative approach.

5.4.1 Lower income tax

When we measure the housing affordability by using HPI and HAI ratio, average income is calculated mainly before tax, while tax is a significant factor to measure the housing affordability, and after tax income should be used to make the measurement more accurate. By comparing Chinese and American progressive tax system with the year 2009 data, we can see how tax affects the affordability of housing.

Table 12: Table of income tax rates in China for an individual in 2009

<table>
<thead>
<tr>
<th>Tax rate (Yuan)</th>
<th>Monthly income (Yuan)</th>
<th>Quick reduction (Yuan)</th>
<th>Tax rate (dollar)</th>
<th>Monthly income – single (dollar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% Less than 500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10% 500 to 2,000</td>
<td>25</td>
<td></td>
<td>10% Less than 698</td>
<td></td>
</tr>
<tr>
<td>15% 2,000 to 5,000</td>
<td>125</td>
<td></td>
<td>15% 689 to 2,833</td>
<td></td>
</tr>
<tr>
<td>20% 5,000 to 20,000</td>
<td>1,375</td>
<td></td>
<td>25% 2,833 to 6,867</td>
<td></td>
</tr>
<tr>
<td>25% 20,000 to 40,000</td>
<td>3,375</td>
<td></td>
<td>28% 6,867 to 14,320</td>
<td></td>
</tr>
<tr>
<td>30% 60,000 to 80,000</td>
<td>6,375</td>
<td></td>
<td>33% 14,320 to 31,138</td>
<td></td>
</tr>
</tbody>
</table>

Source: Jiang (2012), the comparison of Chinese and American income tax.
Comparing China and the US, the low-income class in China pays less percentage tax than in US. The middle-income class in China and US pay similar percentage of tax, while the high income-class in China pays slightly less percentage of their income than in US. Hence, Chinese income tax system relatively favors low-income class compared to US. The Chinese income tax system is favoring the housing affordability of low income class.

5.4.2 Property tax

Property taxes are annual taxes levied on all properties – residential, commercial and industrial. Some countries tax only land, few countries tax only on buildings, and most counties tax on land and buildings. No one likes to pay taxes, and once tax is imposed, people change their behavior to try to avoid paying tax. Property tax affects four types of people: Owner of housing firm, housing consumer, and landowner and capital owners. In the Chinese housing market, property tax plays an important role in the buying and selling. In this thesis, only housing consumer property tax is discussed.

Comparison of property tax in America and China

According to Forbes property tax statistics in January 2009, the median America property tax is 1.4% of the property value per year, which is $1,957 based on a median home value of $135,903 based on a sample of 800 American counties (Wen 2007).

Property tax rate in China is similar to US and Sweden, after 10% to 30% property value deduction, 1.2% is applied to the residual value of house property (Wen, 2007). But the current property tax is only levied only on business houses instead of residential houses, so for most of the household without family business, there is no property tax burden. When purchasing new commercial houses, taxes must be paid according to the Table 13 below.

Table 13: Chinese purchase new commercial house tax rate

<table>
<thead>
<tr>
<th>Property Buying Costs as a percentage of the price of the house</th>
<th>buyer</th>
<th>seller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deed Tax</td>
<td>3% - 5%</td>
<td>Real Estate Agents Fee</td>
</tr>
<tr>
<td>Transfer Fee</td>
<td>0.5%</td>
<td>1% - 2%</td>
</tr>
<tr>
<td>City Maintenance and Construction Tax</td>
<td>0.05% - 0.35%</td>
<td></td>
</tr>
<tr>
<td>buyer Legal Fees</td>
<td>0.2% - 0.4%</td>
<td></td>
</tr>
<tr>
<td>Certificate</td>
<td>5 Yuan</td>
<td></td>
</tr>
<tr>
<td>buyer Stamp Tax</td>
<td>0.05%</td>
<td>Seller stamp tax 0.05%</td>
</tr>
</tbody>
</table>


Property tax in China of the consumer side is a one-time-deal only when people purchase the house. After the purchase, no tax is levied. On the buyer side, buying cost around 5% of the total price, and on the seller side, cost is around 1.5% of the house price.
5.4.3 Issues of Chinese property tax

No property tax in residential houses in China encouraged numerous real estate speculating activities. Buying and building empty houses without paying property tax is one of the major factors of Chinese high house vacancy rate (Lv 2010). Recently, scholars appeal government to introduce property tax to avoid bubble by stopping speculating investment (making empty house expensive to maintain, and making speculating housing purchasing less profitable), and reintroduced a nationwide real estate sales tax in an attempt to reduce speculation and cool down the bubbling property market after price rises accelerated across the country.
6. Complication factors of the figures regarding housing affordability

Besides government policies, many social factors also make the study of urban housing affordability complicated. In this section, three social complications will be discussed: better house quality push up the building cost, the high household saving rate, and house vacancy issue.

6.1 Better house quality and size push up building cost

Housing is more than a physical shelter. The residential environment is not just the dwelling but also the site and setting, neighbors and community, municipality and public services (Stone, 2006). According to the World Bank 1992, in 1980’s, 40% Chinese families were in crowded housing (less than 4 square meter per person), or inconvenient housing (married couple shared a room with parents and teenager children). 60% of Chinese households had no running water and 70% of them had shared kitchen and washing room.

Modern apartments are much better equipped with individual kitchen and toilet. In 2010, the per capita floor space for residents in cities and towns reached 28 square meters, growing at an average rate of one square meter a year since the early 1980s, when the figure was less than 8 square meters (Smith, 2010). The size of apartments is also increasing. Families are getting smaller in China while the desirability for larger apartment is increasing. The 14 shows that the standard house size (per person) in Shanghai increased 8.5 sq.m in 10 year to 26.57 sq.m in 2010.

Table 14: The change of standard Commercial housing (per person) size in China from 2001 to 2010.

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai</td>
<td>18.07</td>
<td>18.99</td>
<td>19.96</td>
<td>20.06</td>
<td>23.08</td>
<td>24.06</td>
<td>25.01</td>
<td>25.68</td>
<td>26.57</td>
</tr>
<tr>
<td>Chengdu</td>
<td>16.28</td>
<td>17.19</td>
<td>18.15</td>
<td>19.15</td>
<td>20.20</td>
<td>21.24</td>
<td>23.00</td>
<td>23.65</td>
<td>24.05</td>
</tr>
<tr>
<td>Wuhan</td>
<td>13.09</td>
<td>13.75</td>
<td>14.47</td>
<td>15.25</td>
<td>16.10</td>
<td>16.72</td>
<td>17.28</td>
<td>18.28</td>
<td>18.74</td>
</tr>
</tbody>
</table>


One major reason for the rapid increase housing prices is the soaring cost of house construction. The life standard of Chinese people has greatly improved since 1979 opening up policy, so when we discuss the high house prices, we also need to consider the great improvement in house quality and size, and the increasing desirability for better dwellings.

The hidden costs of home buying

In China, a distinction is made between the construction space and living space of an apartment. When buying an apartment, unlike in Sweden, Chinese have to pay for the construction space, while the actual living area is around 20% smaller. Besides that, unlike most of the European countries, Chinese houses are usually sold without interior decoration and white electronics. The rule of thumb is that interior decoration per square meter cost from 800 Yuan (USD117 or SEK 876) to 1000 Yuan (USD 146 or SEK 1,093) in urban China. So, an average apartment at the size of 70 square meters would cost an extra 63,000 Yuan (USD 9,197 or SEK 68,886) for interior decoration. If we take the basic white electronics into consideration, it would cost 30,000 (USD 4,380 or SEK 32,803) to 40,000 Yuan (USD 5,840 or SEK 43,737) on top of the house price. Interior decoration and white electronics is a significant hidden cost for buying houses in China.
6.2 High household saving rate

When HAI and HPI are studied in section 2 of this thesis, only income is considered as the source of house funding. In reality, when Chinese buy houses, a large number of households rely more on family saving than on mortgage. Just like the Chinese national saving rate, it is the Chinese character to save a lot and spend less. China has had by far the highest overall saving rate in the world since at least 2000, and the saving rate has increased even further since 2000 - to nearly 50% of GDP. The average household saving is about 25% of disposable income (2008), while the consumption is 29% of the GDP in 2009 (Smith, 2010).

The recent trend shows a growing saving rate, instead of consuming. Chinese families have to save a lot because there’s not a reliable pension plan or a legitimate health care system.

**Figure 10: Personal consumption as a % of GDP China and US**


Figure 10 shows the big difference between China and the U.S. consumption. China has a lot of savings, and a low consumption. There are many discussions about the imbalance of high American expenditure and Chinese high saving rate. According to Smith (2010), every person in the United States has over the past 10 years or so borrowed about 27,400 Yuan ($4,000 or SEK 29,960) from someone in the People’s Republic of China.

In China, before 1979 (planned economy), the saving as a percentage of GDP remained low. Money and wages had a less prominent position in people's minds and in their daily lives. To begin with, it was an economy of constant shortages, and available goods and services were mainly allocated through administrative methods rather than money transactions, saving were neither necessary nor possible.

After 1979, market mechanism started, saving became necessary to cover important expenditures like house and education. Chinese mainly had to rely on our own earnings and try to save enough money to purchase a home. Although salary levels in Chinese industry increased rapidly in the 1990s and tangibly improved living conditions, the inflation rate remained high and limited people's purchasing power.

According to Wu (2004), there are four major reasons why Chinese keep on saving. The first one is the high cost for education, especially private education. The second one is the poor health
care system. The third reason is the poor pension and unemployment benefit system. The last one is the expensive housing.

As the fast-growing economy and bubble, does Chinese save more or invest more?

In this paper, I address that buying house and supporting next generation with house funding is one of the major reasons Chinese keep saving. There is a group of Chinese which is called ‘House slave’ (2007), they are people who enslaved by the burden of paying off a home mortgage. Especially for young people in their 20’s and 30’s, they need a house but could not afford one on their own, so another new words was introduced - ‘NEET generation in China’ refers to young generation whose jobs are not well paid, college degrees don’t give young people the head start and need sponsorship from parents. NEET generation first time buyers are more relying on gifts from relatives and less on own savings in cumulating the down payment. High household saving also busts the housing market. Because of the underdeveloped mortgage system, most Chinese people buy houses with their saving and the savings of their parents and relatives.

According to the statistics from China's Ministry of Commerce 2007, 86.5% of urban residents bought houses with savings from parents and relatives. With the financial help of parents’ saving, these young households with insufficient income still are able to afford a house. On the other hand, young graduates who are not able to get any financial support from the family have to work on their own. This group of young hard working people is usually called ‘Ant tribe’ in China. They are university graduates born in the 1980s, working at an unstable job that pays less than RMB 2,000 per month, living in a shared RMB 350 apartment and spending over two hours a day travelling to and from work in big cities to pursuit their dream. In most cases, they are trying to buy a house by living a tough life. ‘Ant tribe' started to get attentions from authorities. ‘Ant tribe’ are intelligent, hardworking and strong, while the high house price makes their dream hard to reach (Xi, 2010).

In this section we answer the question if Chinese save more or invest more? The effect of high saving rate on Chinese house market is twofold. On the one hand, people keep saving to buy house or support the next generation buying a house. On the other hand, more and more people spend their saving buying properties as an investment. Low-income people are struggling to save for affordable housing while middle and high income people saving less and investing more in properties.

6.3 Imbalance of house supply and demand cause high vacancy rate

One way to make houses affordable for most people is to balance the house supply and demand, supplying varieties of houses with longer durability to satisfy the demand of all income classes. High vacancy rate in China urban real estate shows the imbalance of housing supply and demand.

In China, there are three popular ways to calculate the house vacancy rate: national vacancy area - the national house area, House vacancy area of the houses finished in the past 3 years - total house area constructed for the past 3 years, and house vacancy area of the year - total house area constructed of the year.

The second way is usually used by CASS (China Academy of Social Sciences) to measure Chinese house vacancy rate to match the international standard - and to focus on the study of newly built housing.
6.3.1 Figures of house vacancy rate

In 2005 the vacancy of commodity houses in China reached 0.112 billion square meters, which makes the House Vacancy rate 26%, way beyond the 10% international standard (Huang, 2009).

Hua (2009) analyzed all different types of houses in urban China and stated that 6% house vacancy rate is optimum in China and 8% to 12% is still acceptable.

While government claimed the real house vacancy rate is about 1%. Officials said that we have to look at the big picture including considering the second-hand apartments instead of just new apartments in the market, which would bring down the number of house vacancy rate from 26% to just 1% (Hua, 2009).

6.3.2 Issues of the house vacancy rate

High vacancy rate reveal the imbalance of supply and demand in housing market.

Figure 11: Imbalance house supply and demand

![Diagram showing the imbalance of supply and demand in the housing market.](source: Yan (2004), Emerging land and house in China, p.188.)

Figure 11 presents the imbalance of supply and demand in the housing market. Housing supply quantity (Q) is changing relatively slow due to years of planning and construction, while housing demand is more price elastic (D). P1 is the first balance of D1 and S1. As the increasing supply of housing quantity shifts to S2, if the demand curve does not change, market price would be much lower. If housing market is a ‘buyer’s market’ instead of ‘seller’s market’, demand curve would shift from D1 to D2 to reach a new balance at market price P2 - increasing supply results in decreasing price. As the housing supply increases to S2, it could also be the red demand line, market need bigger houses for families and leisure, so the market price remain unchanged at P1, which is the optimal balance of demand and supply.

In reality, housing price keeps rising as the supply increasing. One reason to explain the imbalance is that the housing supplier gaining more power to control the market price, so demand shifts from D2 to D3 - market reaches another balance at P3. The second reason is the segmentation of housing supply which does not match the demand segmentation. The mismatch was due largely to the high prices and standards of commercial housing and to low per capita income (Yan, 2006).
Theoretically, house price is strongly influenced by the combination of vacancy rate and the fraction of households who are seeking to move. If the house mobility is high and the vacant inventory is low, price will rise rapidly, eventually dissuading households from seeking a new house. Conversely, a large inventory and low mobility (which is the case in China) will lower the price, encouraging households to move and make the needed adjustment to their consumption of housing service (DiPasquale, 2001).

The high house vacancy rate means that the structure of housing supply is not responding to what market really want, but more speculating investment. Meanwhile, groups of wealthy citizens buying more than one apartment and keep it empty as an investment or gift for the next generation. Because of the low saving interest rate and high risk in investing in stock, wealthy Chinese prefer to buy properties to maintain and increase their assets’ value. So there are a lot of apartments which are sold but still left empty in major cities. The speculating investment on both sellers’ and buyer’s side pushes up the high house vacancy rate in China, which makes a huge waste in housing market.

High vacancy rate indicates that low-cost houses are scarce and the market for high-priced high and quality ones keeps growing, even some low-cost properties (like affordable housing) are built into high-priced ones. This is the point where the equilibrium of society is breaking or falling apart. This imbalance of demand and supply can result in society starting to drift from its belief or confidence of owning a house and the social system changing in a different way.

Governing the market is an effective way to control the balance; policy makers imposed curbs on housing speculation, by raising down-payment requirements and mortgage rates. One policy introduced in Beijing 2010 is that buyers must make at least 40% down payment on a second home even if it’s their first mortgage, and it is not allowed to buy a third home even with their own money (State council, 2010).

**Introducing property tax in China**

As mentioned in section earlier of this thesis, adapting a system like the rest of the world by levy property tax on property owner annually would reduce buying and selling empty house speculating activities effectively in China.
7. Conclusions and suggestions future research

Housing price and housing affordability is a key to the sustainable development of China, and understanding the housing affordability is the first step. Chinese housing affordability is more than the HAI & HPI ratios can explain.

Housing affordability measures and ratio study

Housing quantity to income ratio cannot reflect the change of housing and non-housing expenditure ratio. Residual income ratio is based on the definition of minimum consumption, which is subjective and varies. The third measure is Housing expenditure and non-housing expenditure module, it does not embody saving, wealth and other financial aids in the study.

The HAI ratio is limited because it is applied only on mortgage basis and pre-specified mortgage rate and housing expenditure ratio. HPI ratio is more flexible compared the previous measure, but still it could not reflect social and policy effects which was discussed in the third part.

Government is playing an important role in making housing affordable for majority of people. The housing privatization (commoditization) started in 1980’s changed Chinese housing market drastically. Housing provident fund and social housing are designed by Chinese government to help households of different income-groups afford their housing.

Home ownership based housing reform and policies regarding affordability

The study of HPI Beijing and Shanghai are examined based on different data sources during the years of housing privatization. From the study, it is concluded that the Chinese housing affordability is decreasing since the privatization.

Housing provident fund is an income based housing subsidy system, it financially compensates middle and high income groups to purchase their houses. Income based HPF increases the inequality among different income classes. Higher income means more HPF, and in most cases low income groups receives less HPF.

Social affordable housing is designed to provide low and mid-low income classes with affordable housing. Before the privatization, more than half of the urban household were benefiting from the social housing system, while after the privatization, majorities of urban citizens are left out of the system.

Lower tax and no property tax is also a contributing factor to affordability. Chinese income tax is more in favor of low and middle income class which contribute positively to affordability. No property tax also makes it cheaper to keep a house, and encourages speculating in the housing market.

Studying the urban housing affordability based on different measures, figures and polices are not comprehensive enough. Some unique Chinese characters must be considered. In my thesis housing affordability of social groups like ‘house slave’, ‘Neet generation’ and ‘ant tribe’ has also been discussed. Furthermore, the great improvement in house size and quality must be considered as one of the important factors of the price rise. High household saving rate is a unique Chinese culture which affects the financing module of housing purchase and mortgage. High vacancy rate indicate the oversupply of high quality house while neglect the lower-income classes. One effective way is to adapt property tax to control speculating purchasing.
Suggestions for future research

One suggestion for further study would be to study the effect of Chinese property tax on housing affordability. If the government introducing a property tax that could cool down the real estate bubble effectively. However there’s also a possibility that it would make housing even less affordable. A comparison study based on US, Swedish and Chinese property tax system would also be interesting to study further. Finally it would be interesting to study the property tax as a part of the housing cost and how it can affect the housing purchasing mechanism.
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