

# House Price Appreciation And Housing Affordability In Chinese Housing Market

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## **ABSTRACT**

*Housing affordability distinguishes 'housing need' and 'housing access' as the key criteria to examine the ability of the households to enter the housing market or transit into homeownership. Housing affordability was broadly considered as the relationship between housing and non-housing expenditures, which examines the ability of households paying for a house without breaking current living standards or falling into poverty. In the context of economic transition and housing reform in China a fully market-oriented housing market has developed. The expansion of the residential housing market has been accompanied with house price appreciation and inflation, accelerating urbanization, and a rising demand for housing. These changes resulted in potential homebuyers and low-income renters are not able to afford their housing expenditures. Recent research on housing affordability has shifted from estimating affordability indices to policy debates of granting housing and social welfare subsidies.*

*Housing affordability issue combines demographic factors, household formation and financial constraints in estimation. Housing difficulty no longer typically covers very-low-income households, now it is a normative issue that affects moderately low-income households and middle-classes, especially young urban residents. This paper examines the magnitude of Chinese households' housing affordability issues on the basis of the most common measures of housing affordability. National level data are used to get the ratio of housing affordability of different income groups. It was found that 50 per cent of Chinese households facing affordability difficulties, while income differences intensify the situation. There are 5 per cent of households within extreme poor income face the risk of impeding enter the owner-occupied market. With respect to the results, this paper tries to propose further policy measures regarding housing affordability and housing subsidies.*

Key words: *Housing Affordability; Household Income; House Price Appreciation*

Article Classification: Research paper

## **Introduction**

Following the evolution of urbanization and the development of housing market, issues and arguments carried on real estate market has been continuously shifted. Over the past decades, discussion focused upon housing affordability were highly concerned in the US and European. The terminology 'housing affordability' has become a common usage of summarizing housing difficulties for a country. Housing affordability differentiates from notions of housing shortage, slum problem and housing need. Generally, housing affordability means the ability of household to afford a house regarding to households income and housing tenure choices, which examines '...ability to gain access to housing,' and '...the capacity of household to afford housing,' (Thorns, 1988, p.29). It concerned the standard of housing consumption as a merit good that the society set an accepted housing costs level which suitable for society but cannot be accepted by consumers within their income levels (Musgrave, 1959). In other words, housing affordability primarily discusses whether the households have the ability to access the market, and if appropriate how much capacity did households gained to afford housing.

## **Background**

Two entirely different mechanisms carried through Chinese residential market, which operated the urban house allocation provision as a pattern of government welfare from 1950s<sup>1</sup> to 1998, and a subsequent stage transmitted housing allocation system to market-oriented housing market. Housing allocation was a government dominated housing mechanism that Central Government' was fully implementing regulations of welfare system and budgeting housing supply. Housing provision as a form of government welfare that allocated urban houses to employees of state-owned enterprises (SOEs) on the basis of professional titles, length of service and household size. Households who qualified for houses were required to pay nominal fees as maintenance fees or management costs. Housing trade were not existing in the market at that time as households were only have the right to live in the house instead of owning the house. Welfare-dominated housing allocation system temporality solved housing difficulties of employees, this system remained efficient over the years as the average national living standard increased from 4.5 m<sup>2</sup> to 6.36 m<sup>2</sup> in the late 1980s (Chiu, 1996, pp.562). However, due to the population escalating increased demand for living spaces, inequity and shortage allocation issues occurred without interruption. SOEs performed allocation procedure but failed to supervise thereby conniving part of households through some of corruptions to consume houses that should have allocated to others. Such unfair allocation activities directly generated unbalanced living circumstances among urban households. By the late 1980s, there were 26.5 per cent urban populations were faced with overcrowding or homeless (Tang, 1989). Besides, private investment was impeded to enter the market as housing investments was fully controlled by government fiscal budget, housing investment did not get back profits conversely management and maintenance costs aggravated the financial burden. Those issues raised concerns that this system could not remained sustained.

From 1982 some cities were picked as experimental unit to implement house privatization, which urban houses in pilot cities was regarded as commodities that traded by one-third of building costs(Chiu,1996). This is the pilot program of housing reform, however, this proposal did not considered relationship between households income and housing costs as it did not inform how much burden would be imposed for households after paying for housing trading costs within the given income. The modified experimental policies proposed qualified employers could at least subsidized two-thirds of housing costs while the residual amount of house cost was paid by homeowners. It is a breakthrough that ownership of the houses was transformed from non-ownership to home-ownership (Chen et al., 2010) These experiment and complementary reform strategies were drawing to an end in 1998 as Chinese central government formally terminated welfare housing allocation system through reducing allocated housing supply and narrowing investment budget. A financial support system contained mortgage and Housing Provident Funds (HPFs) scheme was introduced to reduce financial difficulties for households. Housing reform embodied a turning point of Chinese housing market,

which is a new stage that urban houses transferred from welfare products to commodities, and more private investment was encouraged to share a place in housing market.

This paper discusses affordability in Chinese housing market referring to key factors of current economic market, the research questions are as follows:

- a) What is housing affordability and to what extent how housing affordability affects in household's housing demand?
- b) What is the magnitude of the housing affordability in Chinese housing market, in terms of household income in different levels?
- c) How housing policy resolves housing affordability?

## **Conceptualizing Housing Affordability**

Generally, housing affordability means the ability of household to afford a house regarding to households income, house price, which asks questions if household is able or nor able to pay for a house within the given income. Early researches on housing affordability states the definition as '...ability to gain access to housing,' and '...the capacity of household to afford housing' (Thorns, 1988, p.29), which concerns the housing consumption as an accepted housing costs that suitable for society but cannot be accepted by consumers within their income levels. Housing affordability issue primarily examines whether the household have the ability to access the market, and if appropriate how much capacity did households gained to afford housing.

With a view to housing costs and income, housing affordability was defined as:

'Affordability is concerned with securing some given standard of housing (or different standards) at a price or rent which does not impose, in the eyes of some third party (usually government) an unreasonable burden on households incomes' (Maclennan and Williams, 1990, p.9).

Housing will be regarded as an unreasonable burden on households if housing costs or rentals exceed the given proportion of household income, hence housing affordability will shift into housing unaffordability, particularly for low-income groups as consequence of the income inadequate (Bramley, 1990, 1992; Maclennan et al., 1990). Bramley (1990) defines affordability from the same concerns:

'...households should be able to occupy housing that meets well-established norms of adequacy at a net rent which leaves them enough income to live on without falling below some poverty standard' (Bramley, 1990, p.16).

The views of Maclennan et al. (1990) and Bramley (1990) discuss housing affordability in relation to non-housing expenditures. Poverty standard refers to the minimum standard for a person to maintain daily life, which equivalent to social required minimum non-housing consumption standard. Falling below poverty after the housing purchase means housing consumption incurs living difficulties for household, which lead to household are not able to maintain the current living standard within their current income (Bramley, 1990). Government judges the extent of inability usually based upon the accessibility to other goods and services after deducting housing consumption, if the household have to squeeze current living standard to support housing expenditures, it faces poor housing affordability inevitably. 'Some given standard of housing' (Maclennan and Williams, 1990, p.9) and 'social sector norms of adequacy' (Bramley, 1990, p.16) are all propose a given standard of housing consumption regards the household income, which is perfectly accepted by society and households. Whitehead (1991) interprets the 'standard' in detail:

‘The standard may be defined in terms of the absolute amount of residual income remaining once the housing has been purchased, i.e., it is set at a level which allows the household to pay for the housing and still purchase a socially acceptable bundle of other goods. Alternatively, the standard may be defined in terms of a relative measure specifying the acceptable proportion of income to be spent on housing. This implies an acceptance of the underlying distribution of income and a view that housing should represent no more than a given element within that income’ (Whitehead, 1991, p.875).

The standard is a given proportion of income that examines if the households could afford a socially acceptable criterion of non-housing expenditures after deducting housing costs. Thereby the amount of residual income may be used to determine the accepted proportion of household income allocated to housing and non-housing expenses. What proportion of housing consumption be allocated determines what level of non-housing expenses can household have otherwise household must forgo or squeeze some of non-housing consumption in order to be able to afford housing consumption without break the poverty line.

Housing ‘need’ and housing ‘affordability’ has been distinguished in Whitehead’s research (1991). Housing need refers to ‘the shortfall between the actual supply of housing of at least the required standard and the quantity of housing’ (Barnett and Lowe, 1990, p.185), or as a simply demand of a quantity and quality house that households would like to buy (Whitehead, 1991). Basically housing need considers the quantity and type of housing that accepted by household, but varies with household size, income, household formation and lifecycle stages. While the definition of ‘affordability’ not only contains housing need of meeting the basic living requirement of households, more importantly housing affordability concerns the capacity of households to finance their housing need. This shows housing affordability links with the household income as it examines to what extent can housing and non-housing expenditures to fulfill maximum utility. It is coincide with what Whitehead (1991) discussed, Bramley (1992) clarifies terms of ‘access’ and ‘affordability’ to interpret definitions of housing affordability. The former, ‘access’ relates to the rules of regulating the households to make owner-occupied transaction; more specific, these rules are income multiple which mortgages borrower should to prepay on the basis of income, and it normally adapted by banks and building societies<sup>2</sup> to lend mortgages. The latter, ‘affordability’ refers to if the households have the ability to pay the mortgage payments or housing expenses plus any equivalent expenditure without falling into arrears or reducing current living standard (Bramley, 1992). That is to say affordability examines paying capacity of mortgage repayments and basic living expenses, which requires a balance relationship between income, housing and non-housing consumption.

Housing affordability issues are primarily reflected as households have difficulties to achieve owner-occupation, or allocate a given proportion of income to housing consumption without breaking current living standards. It is discussed that ‘rapidly-rising house prices, rises in interest rates and economic recession’ intensifies affordability issues (Hancock, 1993, p.127). Housing difficulty no longer typically covers very-low-income households, now it is a normative issue that affects moderately low-income and middle-income groups, especially young urban residents. For low-income households, affordability difficulty is an indisputable fact due to income inadequacy and house price appreciation. Income inadequacy directly results in unaffordability of housing consumption and impedes households to access the market. For some middle-income households with poor education and low working skills, the affordability problems are embodied in that falling rate of income growth could hardly consistent with house prices appreciation. In the situation that increases in income does match house price appreciation, it will postpone some potential homebuyers’ purchase plan as a consequence of liquidity constraints. The other affect is that house price appreciation requires longer saving periods for would-be buyers as house price appreciation is conducive to housing cost increase. Besides, house price appreciation inflates monthly mortgage repayments, some low and middle-income mortgagors may face problems of arrears after paying for both housing and non-housing expenditures.

Chaplin et al. (1994) considers that enough non-housing necessities as threshold of examining affordability by considering given household income, just as: ‘Affordability...must involve ... whether the household has enough income over for the other necessities of life once the housing bills

are paid' (p.6). It coincides with view of Bramley (1994), 'the most coherent normative concept of affordability is one that links normative judgments about housing needs/standards with judgments about minimum income requirements for non-housing consumption' (p. 875). The definition of this perspective implies that affordability does not only discuss economy issues, it runs into the social support considerations. With particular attention to non-housing expenses, poverty line is used to examine if residual income after housing purchase is enough to cover minimum social required daily expenses.

In addition, Bourassa (1996) points out housing affordability is regarded as the adequacy for household's daily requirements of residual income after deducting housing expenditures, but if not, household have to squeeze additional consumptions so as to achieve savings for home purchase. The term 'after-housing poverty' (Bourassa, 1996, p.1869) is proposed as a reference for residual income after housing consumption, which requires that households should have enough money or equivalent wealth to be able to meet the loan-to-value ratio requirement. As noted, 'down payment constraints are binding for many younger lower- and middle-income households to postpone home ownership' (Linneman and Megbolugbe, 1992, p.388). In view of mortgage lending perspective, households are 'able to pay' requires a household with ability of having sufficient wealth capacity to meet the required deposit amount. Besides, the remained capacity and income are required adequate enough to support the subsequently housing consumption, which is a required monthly repayment. For majority of individuals, to obtain conventional mortgage financing is deemed as a sense of affordability as mortgage-lending conditions has filtered out households who have low incomes or high repayment risks.

On the basis of poverty theory Kutty (2005) proposed a new perspective of housing affordability, which is 'housing-induced poverty'. The origin of housing-induced poverty was housing consumption squeezed householders' non-housing expenditures so housing-induced poverty described the situation in which households cannot afford the poverty basket of non-housing goods after paying for housing consumption. The 'poverty basket' was assumed to be two-thirds of the official poverty line, also regarded as 'social accepted minimum non-housing costs' (Stone, 2006); so a household that at the poverty line would face housing-induced poverty if housing consumption was more than one-third of the income (Kutty, 2005). However the 'poverty threshold' and 'social minimum non-housing costs' varies in differences of household size, consumption structure and different countries, this threshold contains a specific datum criterion to explain the explicit affordable level but requires external factors such as consumption structure and regional economic situation into consideration. Just as Stone (2006) concerned, 'how to specify the monetary level of a minimum standard of adequacy for non-shelter items' was a practical challenge' (p.459).

The most common used approach of affordability represents the relationship of house prices and incomes as a ratio, which claims if households paying for housing expenditures more than a given proportion (ratio) it should be regarded as having affordability difficulties (Linneman and Megbolugbe, 1992; Chaplin and Freeman, 1999; Thalmann, 2003; Mostafa et al., 2006; Jones et al., 2011). This approach basically derived from the concepts of 'one week's wage paid one month's rental' and 'at least twenty per cent of the earnings of the husband in the family' (Kengott, 1912, pp. 128-129, 136). The 'given proportion' was defined as 30 per cent, that means households should not pay more than 30 percent of their income for housing consumption otherwise will be deemed as having difficulties in affordability (Linneman and Megbolugbe, 1992; Bourassa, 1996). However this definition does not consider liquidity constraints, household size, non-housing consumption and interest rates changes; neither ignore income inequality between the rich and the poor: for poor and extreme poor households they are not able to afford housing consumption no matter how little income be allocated to housing costs, on the contrary the rich always have surplus income even though they allocate half and more income on housing.

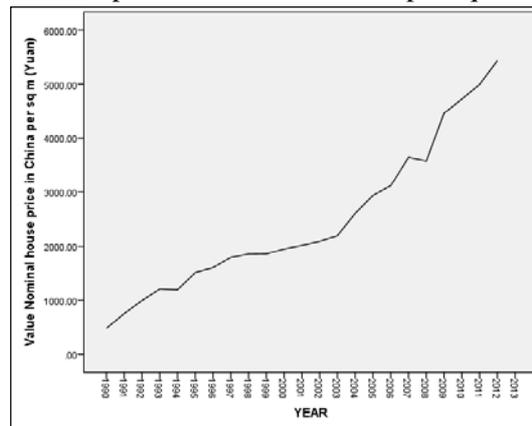
Fisher et al. (2009) introduced amenity factors to estimate housing affordability on the basis of ratio approach. Key to this view was the consideration that location factor would affect house price or rentals, thereby impacting housing expenditure to income ratio as consequences of job accessibility,

school quality and safety, population density are subject to home locations. Subsequently how locations impact housing affordability was discussed by Yang et al. (2013), considerations on accessibility of public services, schools, hospitals and public transportations proved that the opportunity cost of local spatial location was closely related to housing affordability. Hence to examine housing affordability were not purely focus on relationship between economic factors, it combines further functions to examine the magnitude of affordability difficulties for households.

## Causes of Housing Affordability Issues

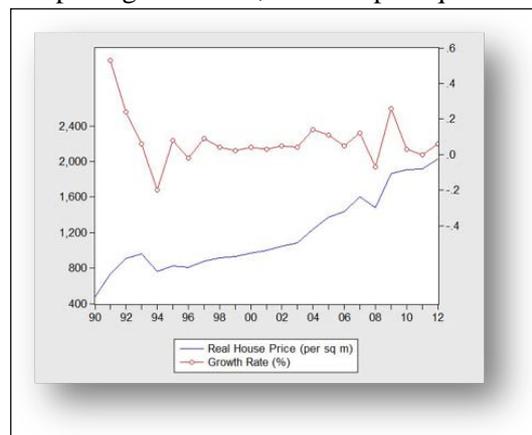
### House Prices

Figure 1: Nominal nationwide house price in China, in Yuan<sup>3</sup> per square meter (1990-2013)



Source: Chinese Statistical Yearbook, 1990-2013.

Figure 2: Real nationwide house price growth rate, in Yuan per square meter, DEF=1990 (1990-2013)



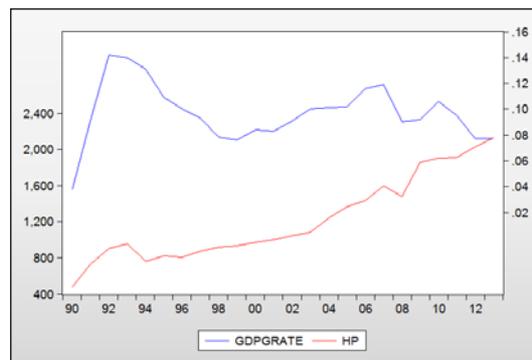
Source: China Statistical Yearbook 1990-2013.

China has experienced three house price booming stage over the past two decades (see Figure 1,2). All real data were deflated by consumer price index (CPI), the same below. The magnitude of price appreciation in 1990-1993 is similar to that of 2007-08 (see Figure 2). House price was accelerated since 2004 due to the urbanization rise and further development of housing market. 2008 is a turning point as global economy environment stepped into recession, residents were eager to buy houses to hedge against inflation thus house price starts an enormous growth from then on.

### GDP Growth

GDP growth is conducive to income increases and brings booming consumptions in housing market, so house price is consistent with an increase in GDP (see Figure 3). Over the years, China continued the bullish growth of GDP by keeping average growth rate above 9 per cent per annum. Economic growth from 1990 to 1992 at a rapid peace and peaking at 14.3 per cent in 1992, which brings corresponding increases in house prices. Furthermore, rapid increases in GDP nearly keep in step with house price growth cycle in the following years (see Figure 3). GDP growth suggests a booming period with living standards improving as evidenced by the proliferation of consumption spending, especially among the housing market. Furthermore upgrade in housing consumption stimulates an appreciation in house price, however, house price appreciation impedes potential households, especially low-income households, enter owner-occupied market, as they are not able to pay raised purchasing costs within their income.

Figure 3: Real GDP Growth Rate and Real House Price Growth, in Yuan per square meter, DEF=1990 (1990-2013)

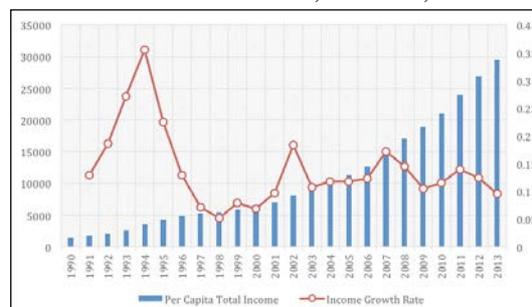


Source: Chinese Statistical Yearbook 1990-2013; author's computation.

### *Falling Rate of Growth Income*

Comparing with house price appreciation, income growth rate reached at the peaking point of 35% in 1994. Albeit income displays the fluctuated increases over the period, the actual situation is growth rate of income has fallen for three straight years from 2011 (see Figure 4). Increases in income does not mean it brings positive effect in housing consumption, however house price and additional living costs are increasing as well, even exceed the magnitude of income growth. This becomes a major obstacle of housing affordability.

Figure 4: Real Per Capita Total Income Growth Trend, in Yuan, DEF=1990 (1990-2013)



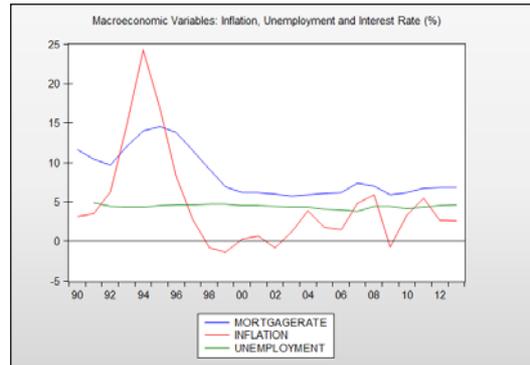
Source: Chinese Statistical Yearbook 1990-2013; author's computation.

### *Macroeconomic Factors*

Changes in macroeconomic environment influences housing market, in particular, changes in unemployment rate, price inflation and benchmark rate are significantly linked with housing affordability issues (Linneman and Megbolugbe, 1992). From economic perspective, unemployment

rate, inflation and interest rate are highly inter-related. High unemployment rate represents an economy recession, both income and price are relative low in that stage, which result in lower inflation rate. Conversely, low unemployment rate contributes in increase of income, but inflation will occur as well (Tobin, 1972). Normally, changes in interest rate are as the tool of regulating economic development. Low interest rate makes more purchasing power is in consumers' hands. Inflation occurs inevitably once too much money is invested in the market (Crowder & Hoffman, 1996). China kept constant unemployment rate but experienced fluctuated inflation and mortgage changes (Figure 5). Housing affordability difficulties associated with changes in interest rate as upward changes result in mortgage arrears and high gearing for would-be buyers and existing mortgagors (Bramley, 1994).

Figure 5: Inflation, Real and Benchmark Rate (1990-2013)



Source: Chinese Statistical Yearbook 1990-2013.

### Methodology and Data Clarify

Quantitative methods are used to this research to examine housing affordability in China. Technically, national level data explain the overall dimensions of affordability difficulties for the country; while household survey data represent the housing affordability difficulties from micro perspective. As some imperfections of survey data in China, this paper will employ national level data obtained from Statistical Yearbook to estimate housing affordability. The most common method of examining housing affordability, ratio test will be used in this study. The data are used to get ratio of housing affordability, ratios in national level will be examined, in terms of house price and household income differences.

In this paper, the author examines housing affordability ratio on the basis of two methods: house price to income and ratio of mortgage repayment to income. Generally the household will be deemed as having affordability if the proportion of housing expenditures exceeds the given per cent of total household income. The required ratio of housing costs to income varies 20-34 (Bramley, 1994, pp. 104), but normally is accepted by 30 per cent (Linneman and Megbolugbe, 1992; Bourassa, 1996). Gan and Hill (2009) discussed ratio approach in detail by introducing repayment affordability. Repayment affordability examines if the mortgage repayments impute burden to households and normally the threshold is a ratio between '25-28 per cent' (Gan and Hill, 2009, p.4). However the acceptable mortgage repayment to income proportion is defined as no more than 50 per cent in China (China Banking Regulatory Commission, 2004), far beyond the above-mentioned ratio. Specifically the ratio test approach are interpreted as follows:

$$\text{Ratio of House Price to Income} = \frac{\text{Total House Price}}{\text{Total Household Income}} \times 100\%$$

Where,

House value = house price (Yuan / m<sup>2</sup>) × average household living spaces × household size

Household Income = per capita household income (Yuan) × household size

$$\text{Mortgage repayment to income ratio} = \frac{\text{Monthly Mortgage Repayments}}{\text{Household Monthly Income}} \times 100\%$$

Where,

$$\text{Monthly Repayments} = A \times \frac{r(1+r)^n}{(1+r)^n - 1}$$

A = Loan Principal = total house value  $\times$  (1-LTV (0.8))

r = monthly mortgage rate;

n = mortgage terms = 360 months

$$\text{Household Monthly Income} = \frac{\text{Annual Household Income}}{12}$$

The imperfection of the method is it does not take liquidity constraint into consideration. As the ratio approach is fully based on the standardized house quality and household size, it may not be able to estimate housing affordability ratio for all types of households and house quantities. Within the given household income, larger-sized households have more difficulty in affording housing consumption than single households, because the former requires more floor spaces than the latter. However, this ratio fails to present such differences between household sizes. Besides, the imperfection in Chinese statistical data is argued by Yang and Sheng (2008) as official statistics do not contain all income sources of household earnings from second or part-time jobs. This is the difference between national level data and household survey data, but in this paper those unregulated income sources are not able to make significant changes in household income because the target income group has income limitations per se.

The challenges in employing this method are the consideration of appropriate house quality and computation of household income. Generally, the standardized quantity of a house in some residential market is embodied in the number of bedrooms (Himmelberg et al., 2005; Bogdon and Can, 1997). However, the house quantity in China is measured as square meter, and house price is expressed as Yuan per square meter, hence what house quantity is the most appropriate is the first challenge. In this paper, the author uses average household living space and average household size to get the total house quantity. The computed house quantity varies in different periods because household size and average living space change in some years. Besides, since the secondary income data obtained from the Chinese Statistical Yearbook are per capita income, so how to compute the household total income is the other problem. The key issue is to choose the appropriate variable between household size and employed size to compute household total income. According to the variable dictionary in the Statistical Yearbook, per capita household income comes from total national income (GDP) divided by total population (Chinese Statistical Yearbook, 1990). It is noticeable that per capita income is not the average income because it includes children and non-working population. In this paper, the total household income is based on per capita income and average household size rather than household employed size.

### *Preliminary Data Interpretation*

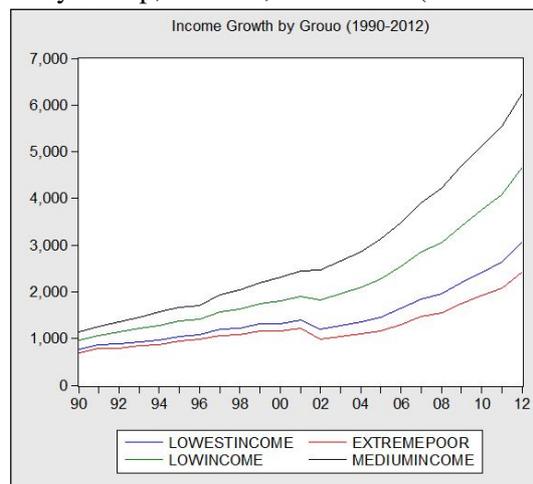
The Chinese Statistical Yearbook as the key official dataset that covers all macro data, however, it contains some imperfections related to this research. Just as above mentioned, data from the statistical yearbook only represent information at the nationwide level, it is not able to investigate data in particular.

### *Household Income*

Household income is the key component in housing research. Household income as the main variable has been widely used in estimating housing affordability (Fisher, Pollakowski and Zabel 2009, Bogdon and Can 1997, Chaplin, et al. 1994). Household total income is computed by average household size and per capita household income, which refers to all kinds of income for a family, which covers labour salary, self-employment, agricultural, industry and commerce revenue, cash income from assets, and transfer income (Rogers & Gray, 1994; Atkinson, & Brandolini, 2001; Hotz & Scholz, 2001; Yang & Wang, 2011).

Comparing with the single period of household survey, the time-service data have advantage in reflecting the dynamic changes in income. As this paper examines household housing affordability, and income inequity is common in China (Heckman and Yi, 2012; Kanbur, R., & Zhang, X., 1999), it is necessary to group household income to reflect every level's affordability issue. Quintile approach has been widely used in existing researches (Rogers & Gray, 1994; Sauerborn, et al., 1994; Deininger & Squire, 1996), which takes the equal proportion of a frequency distribution, each quintile represents one-fifth of the total sample (Grimm, et al., 2008; Wolff, 2012; Vornovitsky, et al., 2014). There are some methods of grouping income have been widely approved. Roberti (1974) took income distribution decile by decile as this measure clearly distinguished dynamics in every decile portions (Roberti, 1974, p.2). Decile approach as opposed to quintile and percentile measures is helpful to amend the inadequacy of overall indices of inequality. Lachman & Weaver (1998) assigned income sample as 7 groups but did not distributed the group equally, Huang and Clark (2002) used same method to group household income from lowest to highest: 5000 Yuan and below was defined as lowest income group, 25000 Yuan and above was highest income group, while the low-income group and middle income group took the ranges between 5001-10000 Yuan and 10001-24999 Yuan separately. Income data are subdivided into 8 groups in Statistical Yearbook (Chinese Statistical Yearbook, 1990-2013), which is bottom 10 percentile, the next 10 percentile, the next three quintiles, and the top two 10 percentiles respectively. In particular, there is 5 per cent of household in statistical yearbook is regard as extreme poor household, which represent not able to obtain constant income or even do not have any income source. Xu and Zou (2000) grouped the household income into 7 groups according the method of Statistical Yearbook. In this paper, the author extracted income data from extreme poor group to medium income group (2<sup>nd</sup> quintile group), which accounts 50 per cent of income distribution in total (see Figure 6).

Figure 6: Real Income Growth by Group, in Yuan, DEF=1990 (1990-2012)



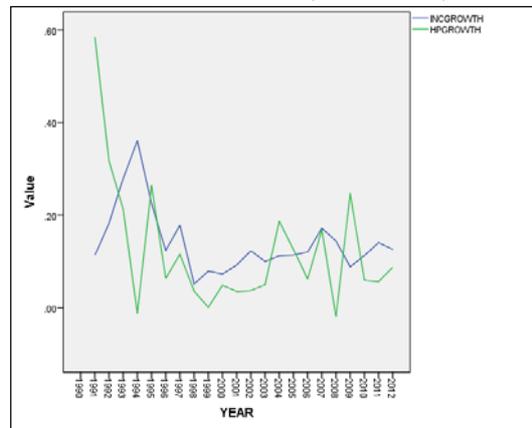
Source: Chinese Statistical Yearbook, 1990-2012.

As displayed in Figure 6, there is significant gap in terms of differences in income groups. Income inequality is a quite common issue in China which started from 1978, as the consequences of the economic reform in 1978 encouraged economic development but caused the differentials of income distribution (Ravallion and Chen, 1999; Yang, 1999). Figure 6 displays income differences between extreme poor income group and medium income group, in fact, income differentials between the poor and the rich constitute a larger proportion of total inequality (Yang, 1999). Since 2001 the gap is widening, particularly by the end of 2012, the medium income (2<sup>nd</sup> quintile group) was 3 times of extreme poor income. Besides, in 2001 the extreme poor income group and lowest income group have experienced decreases in income, while the medium income group remained a stable growth. From the perspective of growth magnitude, the medium income group experienced significant sharp increase over the periods, the growth rate of extreme poor income remained sluggish. Such widening income gaps directly reflect Chinese income inequality issue has spread to middle and low-income groups. On the one hand, income inequality directly results in more and more people are not able to

achieve home-ownership as they are restricted by liquidity constraints and house price appreciation. On the other hand, the patterns of housing allocation also result in the income gap to some extent. Over the processing of housing reform, issues of inequality housing allocation occurs different type of home-ownership, thereby resulting in different property values and household wealth position. Besides, with the booming of market-oriented housing market, house price appreciation further expand the inequality of property value and household wealth power, those who owned more than one houses get benefits by arbitrage, which directly contribute to increases of household earnings. Such inherent inequality issues further stimulate housing affordability difficulties: the investors constantly bind up house prices, the poor gradually not able to afford the house.

### Total House Prices

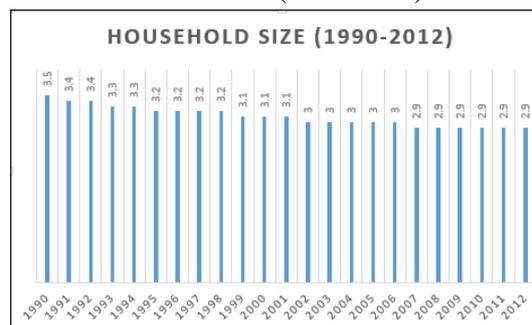
Figure 7: Real House Price Growth Rate, DEF=1990 (1990-2012)



Source: Chinese Statistical Yearbook, 1990-2012.

Figure 7 displays growth rate of house price and income between 1990 and 2012. Comparing with data of real house price in Figure 2, the growth rate displays dramatically volatility. The fluctuated growth rate started in 1994, following a 5 straight years' sharp decreasing (Figure 7). House price growth rate is consistent with income growth for a short period, but started unstable since 2004. In particular, since 2011, income growth had fell for 3 straight years, conversely house price growth experienced sharp rise.

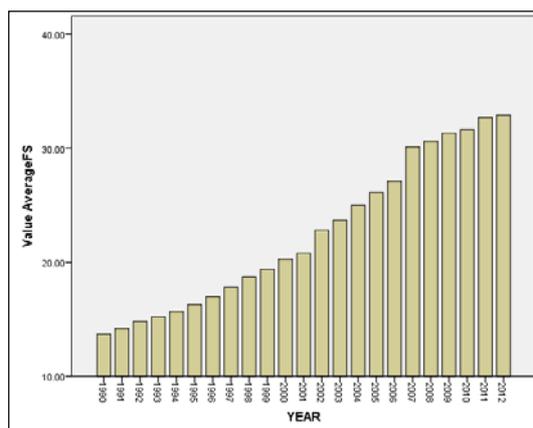
Figure 8: Average Urban Household Size in China (1990-2012)



Source: Chinese Statistical Yearbook, 1990-2012.

Household size as a key factor of impacting housing affordability that has been discussed by several authors (Berthoud & Kempson, 1992; Ford & Wilcox 1992), but this factor does not have significant impacts in Chinese housing market. Just as Figure 8 displays, the average urban household size is on the decrease, as a consequence of 'One Child Policy' and increased living costs.

Figure 9: Per Capita Living Floor Spaces in China (1990-2012)



Source: Chinese Statistical Yearbook, 1990-2012.

As benefited from welfare-dominated housing system, urban employees did not have housing affordability issues, however the living condition was not enough regarding the household size. Just as Figure 9 shows in 1990 the average floor spaces were 13 m<sup>2</sup> per people, then increased to 18 m<sup>2</sup> by the end of 1998 (Chinese Statistical Yearbook, 1990-2012). However, low inflation rate and high rate of income growth (Figure 4 and 5) stimulates the increasingly housing demand in 2002, the average living floor spaces was increased since then. Nowadays the housing affordability issues are embodied in increasingly housing demand and falling rate of income growth. In particular, more and more people are eager to enhance their living floor spaces without considering their actual income situation and affordability, some of them will not able to afford daily necessities after paying for housing expenditures.

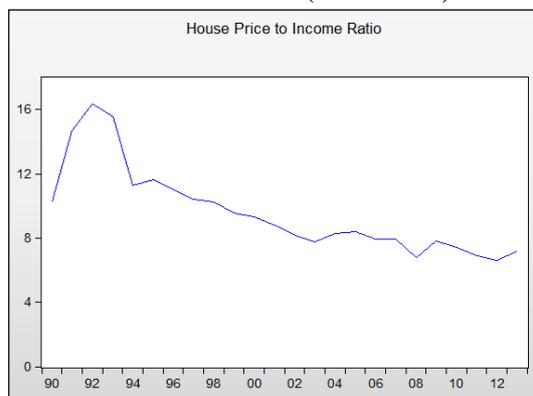
Total house prices are on the basis of average house price per square meter, average household sizes, and average living space, which including all substantially fees. As substantially fees are subject to housing investors and mortgage lending banks, this paper only consider average deflated house price, average household size and average living spaces. In regards total house price, decreases in average household size does not reduce housing difficulties for households because the average living space are increased continuously.

### Findings of Housing Affordability Difficulties in China

Ratio approach as the most common used method of housing affordability set a given proportion of income to house price as the affordable criteria. The following figures display house price to income ratio and mortgage repayment to income ratio from aggregate level.

#### *Ratio of House Price to Income*

Figure 10: Aggregate House Price<sup>a</sup> to Income<sup>b</sup> Ratio<sup>c</sup> (1990-2013)



Source: Chinese Statistical Yearbook 1990-2013; author's computation

<sup>a</sup>According to Chinese Statistical Yearbook (1990-2013) the units of measurement of house price was Yuan per square meter, here ‘house price’ means total house value of the house.

House value= house price (Yuan / m<sup>2</sup>) × average household living spaces × household size

<sup>b</sup>According to Chinese Statistical Yearbook (1990-2013) the household per capita total actual income includes: constant income, one-off income, which refers to quitting work pension, demobilization pension, various bounty and writer’s remuneration, etc. beneficial income, transferring income. Here ‘income’ represents total household income.

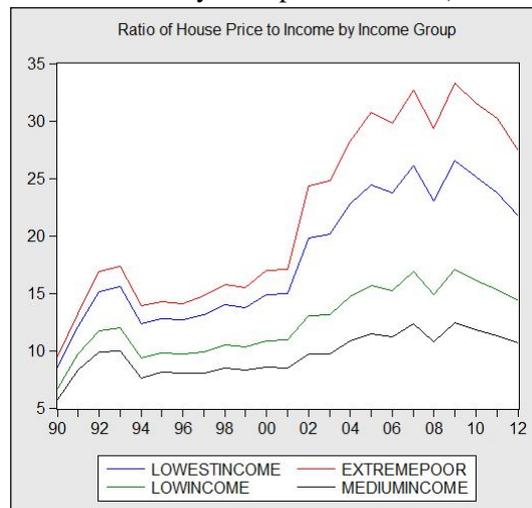
Income= per capita total household income × household size

<sup>c</sup>Ratio=house price (total house value) / income (total household income) × 100%

The ratio of house price to income employs average household size, household annual total per capita income and average living spaces, per square meter house price (Yuan) to get the value. Household size dropped from 3.5 to 2.9 from 1990 to 2013 while the average living spaces increased from 13.7 m<sup>2</sup> to 33.1 m<sup>2</sup> in the same period (Chinese Statistical Yearbook, 1990-2013), so total floor spaces are in an increase over the past decades. As consequence of data limitations, some researchers used an assumed standardized living spaces to get the ratio, say 65 m<sup>2</sup> or 90 m<sup>2</sup> (Chiu, 1996; Yang and Shen, 2008; Chen et al., 2010). However as reported in Yearbook the actual supply of floor spaces was not reached 50 m<sup>2</sup> in 1990, thereby using the standardized floor spaces is not appropriate to estimate the actual level of house price to income, because it will inflate the ratios of earlier years.

As shown in Figure 8 house price to income ratio is decreasing in fluctuations. There are two sharply drop stages in 1994 and 2008 and the peak ratio reached 16 in 1992. The ratio between 1990 and 1994 are apparently higher, technically it represents that total house price costs 16 times of annual total household income. But in reality households did not face housing affordability difficulties over the stage of housing welfare allocation. Before the housing reform, housing affordability did not cause additional pressure on households, employed households were allocated a house, which directly reduced housing pressures. As consequence of housing reform completely ended up the allocation, house price appreciation is consistent with housing purchase demand. Housing affordability becomes a main issue for potential home-buyers. According to the value in Figure 10, a house lower than 100 square meters costs 8 times of annual income of a family of three in 2013. Such a high ratio directly result in more and more potential buyers postpone enter the market. In addition, liquidity constraints restricted them to access mortgage market. Particularly for young age groups that have relative poor working experiences and working skills, it is obviously difficult to afford a house within their current income. High ratio of house price to income prolongs a longer saving period for potential first-home-buyers, particularly low income households, it requires low income households squeeze other items expenditures to maintain savings.

Figure 11: Ratio of House Price to Income by Group DEF=1990 (1990-2012)

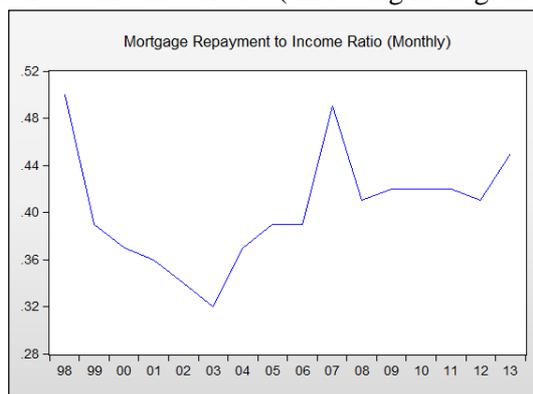


Source: Chinese Statistical Yearbook 1990-2013; author’s computation.

The magnitudes of housing affordability difficulties are subject to differences of income level. Just as Figure 11 shows, the ratios of house price to income display dramatic increase in all income groups, which perfectly explains the impact of household income in housing affordability. The ratio gap, as a whole, is not only significant between the bottom income group and medium income group, but also embodies in differences among every income groups. The ratio gap was widening since 2001, combine with income growth (Figure 6), it can be concluded that the fundamental reason of gap expanding is due to income inequality. From Figure 6 and 11, both income and house price to income ratio experienced sharply increase in extreme poor and lowest income groups. Housing difficulty and income inequality results in extreme poor households are blocked to enter the owner-occupied market. *Ceteris paribus*, such a high ratio requires those groups to keep at least 33 years saving, to pay for the housing costs. However this assumption is not valid as dynamic changes in housing market and labor market are unpredictable. From long run, the periodical fluctuations of economy continuously adjust housing market and regulate house prices, but house price never reduced to a level that the extreme poor household could afford. Under the circumstances, people in low-income level should be given more prior consideration in allocating social securities. On the other hand, those groups are always have relatively poor competition in employment market, they are suggested improve education background and working skills to reduce housing affordability burdens. Medium income group face relatively less burden than the other three income groups, but still struggling with affordability issues. As the ratio for medium income group reached 10 in 2012, which means a house below 100 m<sup>2</sup> takes 10 times of total household income. But these income group has more opportunities in obtaining financial assistance, for instance, Housing Provident Fund (HPFs), an individual savings complemented by work unit subsidy (Yeung and Howes, 2006), which to provide a mechanism through which an employee could save a given percent of their monthly income for a housing purchase (Buttimer et al., 2004).

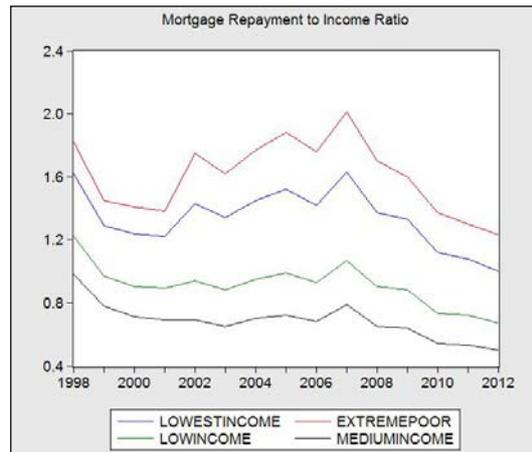
Estimating repayment affordability requires financial capacity, down payment ratio (LTV), and the length of the mortgage, the type of mortgage and the mortgage interest rate into consideration. Comparing with house price to income ratio, the mortgage repayment to income ratio was found to be more optimistic than house price to income ratio. Assume the LTV is 80%, mortgage term is 30 years, the mortgage rate uses annual benchmark rate and the mortgage structure follows Equated Monthly Installment, the aggregate mortgage repayment to income ratio is shown in below:

Figure 12: Mortgage repayment<sup>a</sup> to Income<sup>b</sup> Ratio<sup>c</sup> (excluding management fees) (1998-2013)



Source: Chinese Statistical Yearbook 1998-2013; author's computation.

Figure 13: Mortgage repayment<sup>a</sup> to Income<sup>b</sup> Ratio<sup>c</sup> by Income Group (excluding management fees) (1998-2012)



Source: Chinese Statistical Yearbook 1998-2012; author's computation.

$${}^a\text{Monthly Repayment} = A \times \frac{r(1+r)^n}{(1+r)^n - 1}$$

where, A = Loan Principal = total house value  $\times$  (1-LTV (0.8))

r = monthly mortgage rate;

n = mortgage terms = 360 months

<sup>b</sup>Income represents monthly income

income (monthly) = annual total household income / 12 months

<sup>c</sup>Ratio= monthly mortgage repayment / monthly income  $\times$  100%

Mortgage lending is an emerging sector in Chinese financial market that accompanied with the procedure of housing reform. Figure 12 shows mortgage repayment to income ratio from 1998 to 2013, it can be seen the ratio between 1999 to 2006 keeps in a relatively low tendency, which below 40 per cent. In 1999 and 2007 the ratio is close to the threshold 50 per cent. Even though 50 per cent is regarded as the repayment 'affordable threshold' (China Banking Regulatory Commission, 2004), it requires deliberate discussion whether the 50 per cent threshold is acceptable for middle and low-income households. Because if half of monthly income is allocated to mortgage repayment, it will squeeze related expenses, and impact future savings and consumption structures. Figure 13 represents more issues in housing affordability for all income groups. Although the ratio had fell for 5 straight years, the repayment pressures between high proportion of monthly repayment and low-income level are inevitably. For lowest and extreme poor income household, the monthly repayment even exceeds their monthly income. Within such situation is impossible to entirely depend on squeezing non-housing expenditure to prevent falling into arrears. From the perspective of utility maximization, housing demand is a way of meeting households' initial utility. However, such high repayment ratio is wholly against the utility theory, household are neither able to maintain housing demand nor support non-housing expenditures. High repayment ratio and low income level incurs some unreasonable burdens to household income. Medium income household have more optimistic repayment affordability, but is still poses a risk if they do not make a budget between mortgage repayment and other expenditure within the given income.

Repayment affordability issue indicates if more than half of monthly household income is allocated to mortgage repayment, it will result in unaffordability in meeting daily requirements. Repayment-ratio-overspend contains two types of situations to elaborate affordability difficulties. Normally those who exceed the affordable threshold will face inability in meeting standard daily expenditures, even in arrears, hence squeezing non-housing expenditures is necessary to keep a balance between mortgage repayments and necessities consumption within the limited income. This perspective just coincides with opportunity costs (Hancock, 1993), which indicates the foregone cost of non-housing expenses is used to maintain housing expenditures. But the subdividing cases are, some of households beyond the threshold are because of low-income level and sluggish income growth, the deriving the fundamental reasons are they might in a low education level and poor working skills. These situation occur more typical in needy elders and poor households, social assistance may temporarily solve the affordability problem for such situations, but the long run it is suggested is that to make efforts to improve the

employment levels. The other situation is over-consuming in housing, which means consume high quality houses excessively in regard to their actual income level. In view of location factors affects in housing affordability, to maintain daily consumption and monthly repayment those households should consider rational consumption and avoid choosing prime locations. It seems to be more favorable that housing expenditures, such as monthly mortgage repayment no more than the given proportion of household income. But the particular case is that household remains an acceptable proportion of housing consumption on the surface, however they live in overcrowding condition. In this case those overcrowded household should apply social renting or consider private renting as the appropriate tenure choice.

## Conclusion

Housing affordability summarizes housing difficulties, referring to some key factors of restricting housing demand and mortgage requirements. This issue manifested in several ways, including inability to access owner-occupied market, pay for the housing down-payments, maintain the basic living standard after paying for housing, and even facing risks of falling into arrears. The combined external circumstances resulted in this situation, including changes in interest rates, employment status, size of family and life-cycle stages. However, housing affordability issues are mainly caused by house price appreciation and sluggish income growth. In addition, income inequality in China also raises affordability difficulties; just as the findings display that the gaps between medium (2nd quintile) income group and extreme poor income are significant. The total value of a house below 100 m<sup>2</sup> costs 8 years' of total medium income, while costs 33 years' of extreme poor income, which directly result in the imbalance housing demand in the market: most houses are occupied by the high income group, but more and more extreme poor household facing risks of becoming homeless. To some extent housing affordability becomes a policy issue as it is closely related with social equality and security. Government is expected to enact housing policy, in particular, to enhance housing welfare to those facing housing difficulties. Even though some major housing policy has been put into effect, such as 'affordable housing' project, the policies are not effectiveness regarding the existing affordability difficulties. It is clearly that a larger proportion of households are not able to gain owner-occupation without housing assistance, and this situation is spreading to medium income household. But the existing housing policies have not given supports to medium income households. Financial assistance is necessary for medium income households to solve the liquidity constrains, those in poor and lowest income group should be given prior consideration in allocating social welfare so as to save income for housing consumption. Besides, housing affordability issues are not only incurs burden to owner-occupied households, even troubles low-income renters. So the suggestion is to expand the coverage of housing welfare to relief housing pressure for tenants. The empirical examinations of housing affordability are as significant as theoretical discussions of the definitions. By considering the importance of empirical investigation, the further research will carry on empirical tests by employing household survey data.

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<sup>[1]</sup> The People's Republic of China was founded in 1949, since then the New China steps into a new period of socialist modernization and carries out Planned Economy. This is a developmental milestone for Chinese Economy research.

<sup>[2]</sup> Building societies are equal to savings and loan institutions in the UK, it roughly perform a same function of Housing Provident Fund management centre in China.

<sup>[3]</sup> The Yuan is the base unit of Chinese currency, and usually refers to the primary unit of the renminbi.

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