Asset's structure, household heterogeneity and wealth effects in China: Evidence from the China Household Finance Survey 2015 and 2017

Peng Xu

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Principal supervisor: Roselyne Joyeux

Associate supervisor: Natalia Ponomareva

Department of Economics

Macquarie Business School

Macquarie University

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Abstract

This thesis uses China Household Finance Survey data (CHFS) to conduct an empirical study of the relationship between variations in asset value and asset structure and household consumption in China. Owner-occupied housing, the value of liquid assets and illiquid assets, income, demographic characteristics, and aggregate consumption for each household are considered. This thesis also classifies and discusses hand-to-mouth households, that is those holding no or few liquid assets (e.g., cash and savings account), in China based on Kaplan and Violante's (2014) method and explores the wealth effect of those households on consumption. There are two important empirical results, which can contribute to policy: first, the wealth effect of liquid assets, illiquid assets, and housing assets is positive; and second, Chinese hand-to-mouth households have higher consumption–income elasticity than non-hand-to-mouth households.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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1. Introduction

China is the world's largest single market with a population of 1.4 billion in 2020. In the past two decades, China has implemented many policies to stimulate consumption. In terms of fiscal expenditure, the government has adopted a range of measures, such as issuing consumer vouchers, sending home appliances to rural areas, and providing subsidies for energy conservation, emission reduction, and new energy vehicles. Statistics[1] show that the percentage of household consumption to per capita GDP has continued to drop from 46.9% in 2000 to 35.4% in 2010. Although this ratio has rebounded slightly to 39.3% in 2016, it is still far below the world average level of around 60%[2]. Since 2013, the cumulative year-on-year actual growth rate of per capita consumption expenditure has also shown a downward trend, decreasing from 7.5% in 2013 to 6.8% in 2016, and further falling to 5.4% in 2017. In the process of China's economic transformation from high speed to high quality, the final consumption rate[3] of residents is low, and the economic growth rate is slowing, restricting consumption for economic development.

Several factors contribute to the low final consumption rate of residents. The first is China's stage of industrialization. China is in the middle stage, and per capita income is growing rapidly. Some researchers (Chenery et al., 1986) highlight that the relationship between per capita income and the final consumption rate is U-shaped, indicating that the

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[1] Retrieved from: China National Bureau of Statistics (stats.gov.cn)

[2] Retrived from: Chinese economic information data (https://ceidata.cei.cn/)

[3] The final consumption rate is obtained by: $the\ Final\ Consumption\ Expenditure/_{GDP} * 100\%$, retrieved from World Bank https://data.worldbank.org/indicator/NE.CON.TOTL.ZS

final consumption rate first decreases with an increase in per capita income, then increases as per capita income increases. In the past 30 years, from the early stage of industrialization to the middle stage of industrialization, China has moved from poverty-stricken high consumption to heavy investment and light consumption, so the final consumption rate has fallen. The second factor is the high propensity of residents to save. Despite rapid economic development in China in recent years and continuous improvement in people's living standards, the medical, education and old-age security systems are low in quality compared to those in developed countries. As a result, residents prefer to save in case of future uncertainties. The last and most important factor is the potential effect of the broadening of investing channels and Chinese residents' increasing investment enthusiasm. Since changes in household assets can affect consumption positively or negatively, this is the main point of interest for this thesis.

To explore how the changes in household assets affect consumption, this study first compiles micro data for Chinese households. Some samples that do not meet the study's requirements are removed, then household assets are divided into liquid assets, non-liquid assets, and housing assets according to liquidity. After establishing this qualified sample, this thesis studies the wealth effect of Chinese households and conducts robustness analysis. Age groups and income groups are also incorporated to explore the heterogeneity of the wealth effect by age and income. This thesis also studies hand-to-mouth households in China. Hand-to-mouth households are defined as those holding no or few liquid assets,

such as cash and savings accounts. To solve the endogeneity problem, instrumental variables are used to further test the conclusion after OLS regression. Finally, the wealth effect of hand-to-mouth households is tested.

This thesis makes several contributions. First, many studies have examined household asset allocation and wealth effects on consumption in developed countries, but few study these in the Chinese context. Second, the thesis uses micro data for its research on household level. It is usually not possible to observe households' demographic characteristics, such as the age of the head of the household and educational background, at the macro level. This shortcoming has limited many previous studies. To overcome this limitation, this thesis adopts data from the China Household Finance Survey (CHFS) conducted by the Southwestern University of Finance and Economics and explores the relationship between household consumption and household assets in China. Third, the thesis studies the heterogeneity of consumers in wealth effect analysis. Traditional consumption research often assumes that individuals are homogeneous, and mainly studies aggregate consumption behaviour. However, the heterogeneity of consumers may be important. Research in the field of consumption increasingly is focused on the impact of household asset structure on consumer behaviour. For example, Kaplan and Violante (2010) focus on the impact of liquidity differences caused by asset realization costs on consumer behaviour, pointing out that consumers often have a trade-off between asset realization costs and benefits when making consumption decisions.

1.1 Effects of asset price on consumption

Since the effects of assets on consumption are the main interest of this thesis, it is necessary to first introduce several possible effects of assets on consumption. The first effect is the wealth effect, where increases in assets held by households increase household consumption. There are many reasons for this effect. One explanation is provided by Grant and Peltonen (2008) and Gan and Yin(2009), who find that an increase in the price of assets held by households will directly lead to an increase in wealth and the overall budget of the household, and as a result, to an increase in consumption willingness and consumption growth. The second explanation is given by Gan and Yin (2009) and Browning et al. (2013), who argue that with the increase of asset prices, asset holders' equity increases, and credit constraint decreases, which can enhance holders' creditability and drive consumption increases. This is called the collateral effect. The last explanation is offered by Dynan and Maki (2001), who find that an increase in asset prices (for example, stock) can prompt change in economic fundamentals. Stock price increases imply economic prosperity and positively affect consumers' expectation of future income, which in turn drives the increase in consumer expenditure, which is called the signal transmission effect.

The second effect of assets on consumption is the substitution effect. According to the substitution effect, a rise in asset prices will lead to a reduction in household consumption. Hu and Guo (2012) suggest that there is a substitution effect in China's stock market, and the possible reason behind this phenomenon is that when the price of an asset

rises, households with fixed budget constraints tend to choose to invest more of their income in these price-increasing assets and reduce consumption.

However, there is a possibility that changes in value of assets is not easily perceived by most households, so does not affect households' consumption. To test this hypothesis, a comparative study can be conducted between households who are aware of asset price changes and households who are not aware. A study of this kind is related to household economics and behavioural economics, and therefore not discussed in this study.

1.2 Fluctuations of asset prices and Chinese household wealth

Despite the impact of the COVID–19 pandemic, China's economy is the second largest in the world. Given the rapid rise of China's economy and the maturing of its financial market, changes are occurring in Chinese households. First, the scale of household assets continues to grow. From the beginning of 2000 to the end of 2019, the total wealth of Chinese households increased 21-fold, from US$3.7 trillion to US$78.08 trillion at the current exchange rate. As of the end of 2019, per capita real assets of Chinese households were US$44,349 and financial assets were US$34,008. The average per capita debt is only US$7,395, which is equivalent to 9.4% of total assets. According to Credit Suisse's 2018 annual report,[4] the total wealth of Chinese households is second only to the United States,

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[4] Retrieved from: https://www.credit-suisse.com/media/assets/corporate/docs/about-us/investor-relations/financial-disclosures/financial-reports/csg-ar-2018-en.pdf

and surpasses its own world ranking in 2014,[5] when China was ranked third.[6] In addition, China's asset investment opportunities for households now include financial assets and physical assets, such as housing, and are no longer limited to bank deposits, stocks, and bonds.

With this rapid growth in the volume of assets in Chinese households, variations in asset prices are of interest. One example is the financial asset represented by stocks. As can be seen in Figure 1, the total market value of Chinese stocks was 1,752.9 billion yuan in 1997, followed by several years of insignificant development, before the market experienced rapid growth in 2006. After several violent fluctuations, total market value reached an all-time high of 797,238 billion yuan in 2020, 45 times higher than in 1997. With total wealth increasing so quickly, the value of stocks is also growing fast. It should be noted that the variation in asset prices has some effect on household consumption according to the theories introduced in Section 1.1. The section 4.1 outlines how financial assets play a role in household consumption.

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[5] Retrieved from:
https://www.credit-suisse.com/media/assets/corporate/docs/about-us/research/publications/global-wealth-databook-2014.pdf
[6] Retrieved from: https://www.credit-suisse.com/about-us-news/en/articles/news-and-expertise/global-wealth-report-2018-us-and-china-in-the-lead-201810.Hand-to-Mouthl

Figure 1 The total market value of Chinese stock (billion yuan)

Data from https://ceidata.cei.cn/
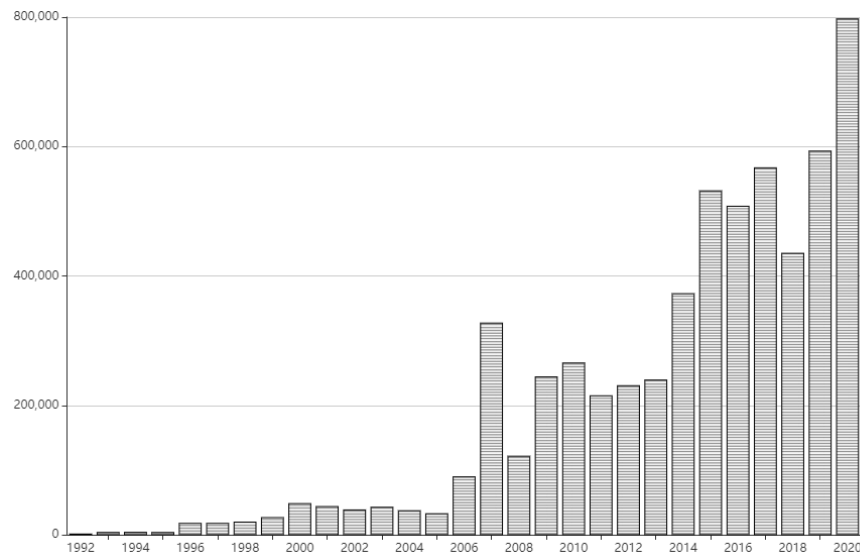
As well as financial assets, which have obvious variations in prices, this thesis is also interested in non-financial assets, which have relatively stable prices. Non-financial wealth mainly consists of fixed assets, including housing assets and vehicles. The nature of these assets means that the accumulation of non-financial assets is relatively more stable than the accumulation of financial assets. The most important fixed assets are housing assets, and, as shown in Figure 2, the national value of real estate investment has increased 44 times, from 317.8 billion yuan in 1997 to 14,144.2 billion yuan in 2020. In 2019, the homeownership rate of urban households in China was 96%, and houses accounted for more than 60% of total assets[7]. The way in which non-financial assets such as real estate affect household consumption is also explored in the section 4.1.

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[7] Retrieved from: Chinese Economic Information https://ceidata.cei.cn/

Figure 2 Real estate investment in China (billion yuan)

Data from https://ceidata.cei.cn/
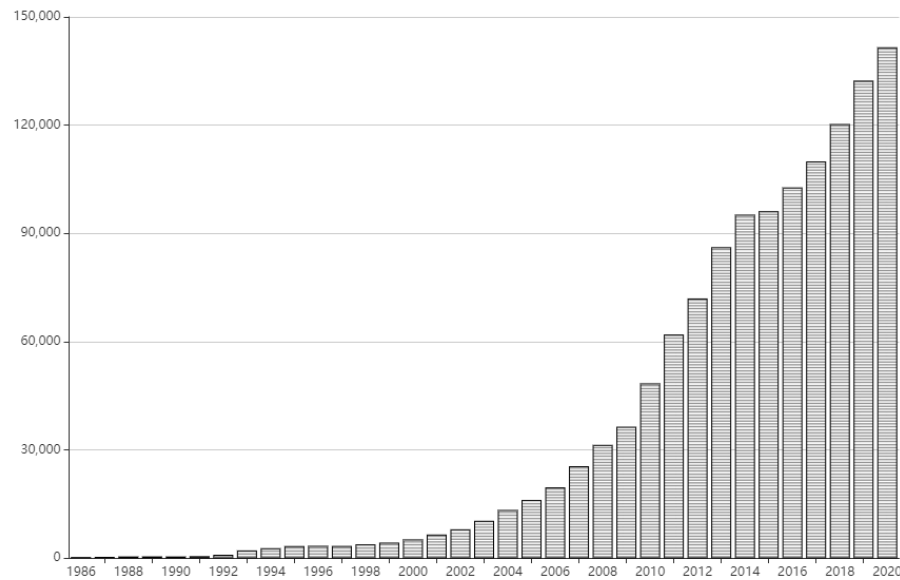
In summary, the increase in the scale of household assets and the diversification of their structure have not only improved the wealth of residents but also helped to broaden the channels of property income and increase the income of residents. Moreover, these improvements and variations might have an effect on household consumption. This thesis explores these effects based on a more precise classification of household assets.

1.3 The structure of Chinese households' assets

Most studies focus on the direct impact of asset type, quantity, and price changes of assets on consumption, such as research on the wealth effect and substitution effect. Other scholars focus on how different asset structures affect household consumption (Kaplan & Violante, 2014; Campbell & Mankiw, 1991; Jappelli & Pistaferri, 2009). This perspective

helps in understanding and evaluating the effect of consumption stimulus policies. Since this thesis considers asset structure in its analysis of household consumption in China, the structure of Chinese households' assets is summarized in this section.

First, there are significant differences in wealth between Chinese households. According to the 2017 CHFS report, the top 10% of China's households accounted for 84.6% of the total household assets, and the top 10% of Chinese households' income accounted for 57% of total income. Although the macro data show that the total volume of China's household assets is large and developing rapidly, significant inequalities exist within China's households, which is difficult to observe with the macro data.

Besides the differences in the value of assets, there are big differences in the asset structure of Chinese households. In 2017, the savings rate from income of Chinese households was 19.25%, but 79.4% of savings came from the highest income households (top 10% of all households), and the savings of middle-income and low-income households were less high than the aggregate data suggests. Households with financial assets account for only 8.8% of total households, and the financial assets (stocks, funds, and other financial products) of these households account for only 2.12% of total assets. This unique Chinese asset structure leads to the definition of liquid assets in this thesis as cash and household savings.

The disparities between urban and rural households are also very significant. According to the Chinese Household Finance Survey Centre report (2017), the average asset value of

urban households in China in 2017 was 2.476 million yuan, while the average asset value of rural households was 0.377 million yuan, meaning the average asset value of urban households is 5 to 6 times higher than that of rural households. Like asset value, the average annual income of urban households in China reached 70,876 yuan, while the average annual income of rural households was only 22,278 yuan, which is one third of urban households' income. To take this heterogeneity into account, this thesis relies on *hukou* to reflect the urban and rural identity of Chinese households. Since 1958, China has implemented a registered residence system (*hukou*), dividing residents into rural residents and urban residents, with each type of resident having access to different benefits. Generally speaking, households in rural areas are eligible for rural *hukou*, and households in urban areas are eligible for urban *hukou*. But with migration between rural and urban areas, many rural residents are employed in urban areas, so this mismatch between their *hukou* and work location means rural residents do not receive, for example, urban medical insurance, unemployment insurance, and public educational resources, despite working in urban areas. *Hukou* strongly affects a household's lifestyle, so this thesis takes *hukou* as one of the control variables.

In summary, this thesis takes asset structure into account, because, first, the way in which the different asset structure within Chinese households affects household consumption is worthy of study. A second reason is that although Kaplan and Violante (2014) provided a new way to classify households and Cui and Feng (2016) offered some

insights on Chinese households' consumption, neither study explored the joint relationship between asset structure and the wealth effect. This study seeks to fill this gap.

1.4 Research questions

Usually, a country's monetary policy has a significant impact on asset prices, such as stocks and real estate (Kuttner, 2015). However, monetary policy seems unable to influence the slowly-changing volatility of first-tier-cities' real estate prices, in contrast with the effectiveness of macroprudential policy (Deng et al., 2018), regardless of the controversial views on the effect of the monetary policy. The Chinese government can still control house prices through macroprudential policies such as strict purchase restriction policies and housing loans, thus further affecting household consumption. Regardless of the positive or negative effects of different policies, the common element is that the assets play a role in the transmission mechanism from the policy to household consumption.

This study analyzes the relationship between assets and consumption according to three perspectives, with the aim of supporting policymakers in developing policy.

Q1: What is the wealth effect of different assets in China?

Q2: What is the effect of asset structure on household consumption in China?

Q3: What is the wealth effect on hand-to-mouth households in China?

The thesis is organized as follows. Section 2 reviews the literature, including summarizing the contributions and limitations of previous research, and identifying gaps. Section 3 introduces the dataset and the sample selection. Section 4 presents the empirical results of this thesis and the robustness tests. Section 5 summarizes the contributions then points out the limitations and puts forward relevant policy recommendations from the perspective of increasing consumption for Chinese residents.

2. Literature review

To study the relationship between household wealth and consumption, the study examines two elements: the wealth effect and how the structure of household assets affects consumption. This literature review is organized as follows. Section 2.1 introduces the theory of consumption and divides its development into three stages. Section 2.2 reviews the theory of the wealth effect and presents the relevant research gap. Section 2.3 reviews the literature on consumer heterogeneity and presents the relevant research gap.

2.1 History of research on consumption theory

The study of consumption in economics can be traced back to the eighteenth century and Adam Smith, whose ideas have been continuously developed and refined by scholars. The different hypotheses and models can be roughly divided into three key phases. The first phase focuses on the theory of the short-term consumption function of consumption expenditure versus immediate income and does not consider and analyze expected income or uncertainty. One of the more representative theories is Keynes' (1936) absolute income hypothesis and Duesenberry's (1949) relative income hypothesis. The second phase focuses on a theory of consumption function that relies on utility theory to study consumption, considering present and expected income without considering uncertainty. The more influential theories in this phase are Modigliani's (1966) life cycle

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hypothesis (LCH) and Friedman's (1957) permanent income hypothesis (PIH). The third

stage can be understood as the expansion and development of the life cycle hypothesis,

which takes into account expected income and adds a theory of consumption function

taking into account uncertainty. It mainly includes the random walking hypothesis by Hall

(1978), precautionary savings hypothesis of Leland Hayne (1978), the liquid constraint

hypothesis, and so on.

2.1.1 Short-term consumption function theory

Keynes' absolute income hypothesis

Keynes (1936) believed that savings and consumption depend on disposable

income. In the short run, consumers will consume according to the amount of their current

income level. According to his absolute income hypothesis, as income increases,

consumption increases accordingly, but the increase in consumer spending is less than the

increase in income, that is the marginal propensity to consume is less than 1. In other words,

as income increases, consumers will be more inclined to save than to consume. Keynes'

theory linked consumption with income and guided the direction for future research, but

the absolute income hypothesis also has certain limitations. This theory only considers the

effect of current income on consumption expenditure and analyzes the relationship between

short-term consumption and current income. It treats household consumption as a pursuit

of utility maximization under the current period budget constraint, without considering that

rational consumers will optimize their consumption path under the budget constraint over their lifetime. More importantly, the absolute income hypothesis ignores mobility constraints and consumer heterogeneity.

Duesenberry's relative income hypothesis

The relative income hypothesis proposed by Duesenberry (1949) takes an opposite approach to absolute income hypothesis, in introducing social and psychological factors to allow for consumer behaviour. This leads to the two core ideas underpinning the relative income hypothesis (demonstration effect). First, consumer spending is not independent but is influenced by the consumption and income of related groups. Second, consumer consumption is influenced by past consumption and income, in addition to current real income (ratchet effect). The relative income hypothesis still faces the same limitation as the absolute income hypothesis, as it does not extend the span of consumption as an act over a person's lifetime and similarly does not take into account mobility constraints and consumer heterogeneity. However, this theory explains the relationship between income, consumption and savings from a new perspective, which is the distribution of income between consumption and savings depends on the relative income of consumers rather than on their absolute income.

2.1.2   Long-term consumption function theory

Permanent income hypothesis

Friedman (1957) argues that the purpose of consumption is to increase utility, and therefore the consumption function must be based on maximizing consumer utility. According to this theory, a rational consumer will determine total lifetime consumption based not only on current income but also on their total lifetime income so as to maximize utility in the long run. Friedman divides consumers' real income into two parts: transient income and persistent income, while consumption is also divided into two parts: transient consumption and persistent consumption. He argues that transient consumption is determined by transient income, while persistent consumption is independent of transient income and depends only on permanent income.

Life cycle hypothesis

Modigliani (1966) closely links consumption to income and the consumer's life cycle. Like Friedman, he argues that consumers are rational and use their lifetime income according to a utility maximization principle, arranging the ratio of consumption and savings. Consumers need to allocate their total expected lifetime income optimally at different ages. When young, and income is higher than consumption, consumers must save a portion of their income for future income decline in old age. And when consumers retire,

their income declines, at which point they use savings or receive transfer income from their children, at which point they consume more than they earn.

The life cycle hypothesis and the permanent income hypothesis compensate for the short-term income theory by extending the act of consumption to the lifetime of the consumer. Both theories assume that consumption depends on long-term income levels. The difference between the two is that the life cycle hypothesis emphasizes the effect of expected expenditures on consumption behaviour, while the permanent income hypothesis emphasizes the effect of expected income on consumption behaviour.

2.1.3   Extension of the life cycle hypothesis

Random walking hypothesis

The life cycle hypothesis and the permanent income hypothesis were further investigated by Hall (1978), who proposed the random walking hypothesis. He argued that to maximize utility the consumer's consumption trajectory is a random wandering process. No variable other than consumption in the current period can help predict consumption in the next period. That is, only the next period's consumption is independent of the next period's income and is only related to the current period's consumption.

Hall's theory has made an important contribution to research in the area of consumption, although it is not without critics. Flavin's (1981) research showed that

changes in consumption and changes in income are significantly correlated and that past changes in income help predict future changes in consumption. Campbell and Deaton (1989) also find that the theory's expected changes in consumption do not correspond to actual consumption changes.

Precautionary savings hypothesis

Leland (1978) found that consumers become cautious when future income is expected to be constant. When that is the case, they choose to save more in order to cope with possible changes in future income and the resulting risks, and Leland calls this type of saving precautionary savings because of the consumers' uncertainty about future income. Later, Carroll (1997) studied this theory and also concluded that the main motivation for saving is to prevent unexpected events. The precautionary savings hypothesis is an important extension of the life cycle hypothesis and the permanent income hypothesis, introducing uncertainty into the theoretical analysis.

Liquidity constraints hypothesis

To explain the inconsistency between empirical analysis and consumption theory, Campbell and Deaton (1989) proposed the liquidity constraints hypothesis. This hypothesis argues that the presence of liquidity constraints may lead to consumers' current consumption being sensitive to changes in predictable income. They argued that

consumers' consumption is lower when they are subject to liquidity constraint than when they are non-liquidity constrained, making the effect of current income on current consumption greater than that predicted by the life cycle hypothesis and the permanent income hypothesis.

The liquidity constraints hypothesis and the precautionary savings hypothesis have significant similarities in their implications for consumer behaviour. Liquidity constraints may be an important motivation for consumers to have precautionary savings. Still, the liquidity constraints hypothesis places more emphasis on the direct response of consumption to income, whereas the precautionary savings hypothesis focuses on considering the uncertainty of future consumption.

Buffer stock saving hypothesis

Deaton (1991) and Carroll et al. (1992) proposed the Buffer stock saving hypothesis based on Leland's precautionary savings hypothesis, which considers the effects of both precautionary savings and liquidity constraints on consumption. The hypothesis is that consumers have a target ratio of wealth to permanent income. When consumers have less wealth than this target, the incentive for precautionary savings will exceed the desire to consume, and consumers willconsume a larger proportion of their income. When wealth is higher than this target, the desire to consume will outweigh the desire for precautionary savings, and consumers will consume a larger proportion of their income.

The buffer stock saving hypothesis provides a new approach to the study of consumer problems and explains some consumption behaviours that cannot be explained by other consumption theories. This thesis can be understood as an extended study of the buffer stock saving hypothesis since it considers liquidity constraint and precautionary saving in a similar way.

2.2 Wealth effect

Changes in the value of wealth lead to consumption changes, also known as the "wealth effect", which has been the subject of academic study for some time. Arthur Cecil Pigou (1941) first described this phenomenon: under conditions of perfect competition, when prices fall during a recession, the net value of wealth increases, and consequently the consumer's desire to consume increases. The essence of the wealth effect is that asset price fluctuations will lead to changes in the value of wealth, and changes in wealth affect residents' behaviour, wealth expectations, budget constraints, economic expectations, and household consumption.

After Pigou (1941), most researchers (Ando & Modigliani, 1963; Hall, 1978) have put assets into the framework of analyzing consumption, and further proved that asset price fluctuations will cause an increase or decrease in consumption, but have not further explored the wealth effect. However, in the 1990s renewed interest in the wealth effect saw it extensively studied in academic research. In this period, the market value of stocks grew

rapidly and housing prices also increased. Researchers became interested in the wealth effect of assets and how assets affect consumption, and the main findings of their studies focused on the marginal propensity to consume or consumption elasticity due to the wealth effect (Paiella, 2009). Since earlier studies did not distinguish between different types of assets, critics argue those early studies relying on aggregate wealth do not clearly explain the relationship between wealth and consumption. Some researchers (Bostic et al., 2009; Carroll et al., 2011; Case et al., 2005; Poterba, 2000) tend to distinguish between housing assets and financial assets. The wealth effects caused by these two types of assets were usually considered to be different due to significant disparities in characteristics such as liquidity, ease of valuation, the persistence of shocks, and suitability for consumption financing.

Stock asset

First of all, among financial assets, stock assets are studied by scholars. Many households hold stocks directly or indirectly. Generally speaking, the liquidity, yield, and risk of stocks are higher than other assets, and they are easier to count.

An early study by Elliott (1980) on US consumer spending, financial wealth, and non-financial wealth showed that changes in non-financial wealth do not affect total consumption. Mankiw and Zeldes's (1991) research showed that the consumption

behaviours of stockholders are more closely related to the stock market than the behaviours

of non-stockholders. After studying the effect of stock market wealth in the United States,

Ludvigson and Steindel (1999) concluded that there is a significant positive relationship

between stock wealth and total consumption. For every $1 increase in stock wealth,

consumption would increase by 3 to 4 cents. However, Ludvigson and Steindel (1999)

found that these relationships are unstable and that it is difficult to eliminate this instability.

Alan Greenspan (1999), as Chair of the US Federal Reserve, confirmed the contribution of

the stock market wealth effect to economic growth.

Housing asset

Housing assets are the most important assets of households in many countries,

accounting for many household assets. Jonathan Skinner (1989) argued that when house

prices rise, people who do not own a house (such as tenants) have a higher propensity to

save compared to house owners (Skinner, 1989). Engelhardt (1996) used the US Panel

Study of Income Dynamics data to find that rising residential asset prices have little to no

effect on consumption. Hoynes and McFadden (1996) found that residential assets have

only a limited effect on consumption. Levin (1998) used US Retirement History Survey

data and found no effect of real estate prices on consumption.

There are few studies comparing the wealth effect of stock assets and housing assets, and the results of those studies are inconsistent. Using data from the Michigan Survey Research and Analytics Center consumer Survey, Starr-McCluer (2002) found that close to 85% of respondents felt that recent stock market movements had no impact on their saving or spending. Only 3.4% of stockholders had increased spending or reduced savings because of higher stock market prices, such as buying a home or a car, or going on more holidays than usual. Another 11.6% of stockholders increased their savings instead. The study found that the wealth effect of the real estate market is significant and greater than that of the stock market in 14 countries, including the United States. Dynan and Maki (2001) examined the effect of US stock market prices on consumption. Their results demonstrate that a direct increase in wealth leads to a rapid increase in consumption and lasts for several quarters. However, the indirect channel that affects consumer spending by influencing expectations is not a determinant of consumer spending. By analyzing data for 16 countries over 30 years, one of the main conclusions obtained by Bayoumi and Edison (2003) is that the effect of housing wealth on consumption is greater than the effect of the stock market on consumption.

Finally, the above studies show that there is a very long history of research on wealth effects in academic research, which can further prove the importance of wealth effects. However, the conclusions of these studies are not consistent. There are many possible

reasons for these outcomes. The wealth effect varies across countries and cultures and it may also vary across time.

Research gap relating to the wealth effect

When studying the wealth effect, most researchers only focus on changes in consumption caused by changes in a certain asset, such as real estate (Engelhardt, 1996; Hoynes & McFadden, 1996; Skinner, 1989) and stocks (Ludvigson & Steindel, 1999; Mankiw & Zeldes, 1991). This can cause two potential problems. First, it ignores some crucial assets for households, such as insurance and pension assets, and these neglected assets might also have a sizable impact on consumption (Blundell et al., 2008; Mankiw & Zeldes, 1991). Blundell et al. (2008) and Mankiw and Zeldes (1991) both argued that insurance and pension accounts will have an impact on consumption but did not identify the size of the impact. Second, since studies focus solely on certain assets (Engelhardt, 1996; Greenspan, 1999; Hoynes & McFadden, 1996; Levin, 1998; Ludvigson & Steindel, 1999; Skinner, 1989), some households are excluded from their research. Hoynes and McFadden (1996) only focused on certain households with real estate, and Mankiw and Zeldes (1991) only paid attention to households with stocks, so their results can only represent limited households in society. This means their conclusions are of limited value to policymakers seeking to formulate relevant policies because many households who do not own real estate or stock assets have not been observed in these studies. While considering the various assets, some studies have further considered different ways to

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classify household assets. Bayoumi and Edison (2003) divided assets into financial assets and non-financial assets based on liquidity, and non-financial assets included real estate and durable goods. Buiter (2010) proposed that housing assets have stronger investment attributes than durable goods, so it might be more reasonable to study these two assets separately. These studies provide part of the criteria to classify households' assets.

Moreover, many studies are based on macro data for the effect of wealth. It is thought (Dynan & Maki, 2001; Ludvigson & Steindel, 1999) that research using macro data has inevitable limitations, which make it impossible for the research to accurately identify whether the change in consumption is caused by households experiencing changes in assets. In addition, macro data does not have demographic and economic characteristics of households, and the omission of this information can lead to problems of over-summarizing. Interestingly, this argument can also be found in other research that uses regional data (Starr-McCluer, 2002). In the Michigan Survey Research and Analytics Center consumer survey, it is claimed that research results are affected by the cultural and economic conditions of a certain region and may not be generalizable to the whole United States.

There are few studies on the wealth effect of Chinese households, as most of the relevant studies focus solely on the impact of real estate assets (Hong, 2006; Zhou & Ju, 2008) and stock assets (Cheng, 2009). Other research points have not been addressed. For example, the discussions above are from either a micro view or a macro view. Although the existing literature has paid much attention to these two aspects individually, joint

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research on the wealth effect and consumer heterogeneity has been missed. Due to the complex relationship between household consumption and household assets summarized by Pigou (1941) and other scholars, combining these two separate perspectives, that is, the wealth effect of assets and the impact of wealth distribution, is of value, not only in helping to fill the research gaps outlined above but also in providing a more accurate picture of the actual situation in China, which helps policymakers to formulate more targeted policies.

From the discussion above, it is clear there is a narrow and limited research view of households' assets, such as the classification of households' assets. Many scholars have focused less on China's household assets question, using a micro-level database to explain household consumption and household assets. This study attempts to explore the relationship between consumption and household assets from a household perspective. The CHFS database has data from 28 of 32 provinces in China and collects many economic and demographic data items on households. This classification includes most crucial and commonly held assets for Chinese households and helps to reveal the wealth effects of different assets in Chinese households.

2.3 Consumer heterogeneity

Shapiro and Slemrod (2001) studied households receiving an income tax rebate of $300 or $600 in 2001 in the United States. They found that only 22% of the households would increase their consumption, and more households would save the income or repay their

loans. For example, households who did not hold stocks would prefer to consume, while households who held a small number of stocks would prefer to save. This study showed that different households have different responses to fiscal policy, but the authors did not discuss in depth what factors may cause this difference. Blundell et al. (2008) also conducted relevant research on the relationship between income and consumption inequality. Based on their comparative study of two US stimulus plans in 2001 and 2008, they argued that consumption inequality is caused by consumption insurance. Consumption insurance is defined as the ability of households to insulate themselves from income shocks, and these "abilities" include access to credit, availability of information to consumers, the duration of income stocks, tax, welfare, formal insurance, informal gifts, and transfers.

Campbell and Mankiw (1989) found that introducing hand-to-mouth households into the model can better explain the characteristics of consumer expenditure. The traditional method of measuring hand-to-mouth households is to use microeconomic data on the family portfolio to identify the poorest households – those whose net assets are close to zero (total assets minus liabilities), but this type of family is a very small group.

In 2014, new concepts appeared in the field of consumption. Kaplan and Violante (2014) used the heterogeneity of household wealth to classify households and redefine a hand-to-mouth family. In household asset structure and consumption, although Kaplan and Violante (2014) found that the structure of households holding different liquid assets would

affect consumption, they ignored the particularity of housing assets when distinguishing hand-to-mouth households.

The panel dataset for Kaplan and Violante's (2014) study found that the transmission coefficient of wealthy-hand-to-mouth households' and poor-hand-to-mouth households' short-term income shock to consumption is significantly greater than that of non-hand-to-mouth households, but the demographic characteristics and portfolio composition of wealthy-hand-to-mouth households are closer to those of non-hand-to-mouth households. Following Kaplan and Violante's research, Cui and Feng (2016) used cross-section data from the CHFS to study wealthy-hand-to-mouth households in China. Their research results are consistent with those of Kaplan and Violante, proving that the characteristics of hand-to-mouth households in China are the same as those in developed countries. Other recent empirical studies of hand-to-mouth households (Hara et al., 2016; Song, 2020) in Japan and Korea have similar findings to those of Kaplan and Violante.

Research gap

Kaplan and Violante (2014) looked at hand-to-mouth households but did not discuss non-hand-to-mouth households in-depth. The non-hand-to-mouth type of household makes up the vast majority of the population. Just as hand-to-mouth households can be classified into wealthy-hand-to-mouth and poor-hand-to-mouth, non-hand-to-mouth households can also be classified into wealthy-non-hand-to-mouth and poor-non-hand-to-mouth. Examining whether there is a difference in the income elasticity of consumption between

these two types of non-hand-to-mouth households can provide further insight into the relationship between non-liquid assets and consumption. Hand-to-mouth households can be classified into wealthy-non-hand-to-mouth and poor-non-hand-to-mouth households. Moreover, Kaplan and Violante (2014) argued that the classification of a hand-to-mouth household should be set as a household whose current assets are less than half of its monthly income, that is, they assume that the household's decision-making cycle is in months. Other research in China, South Korea and Japan (Cui & Feng, 2017; Hara et al., 2016; Song, 2020) also follows Kaplan and Violante's classification. However, some studies in China show that the income of some Chinese households is affected by seasons, especially rural households, and other households whose incomes are seasonal. Tan and Wang (2016) found that China's rural household income is affected by seasons, and the income in autumn accounts for more than half of annual income. Considering the actual situation in China, this thesis introduces a control group to include Chinese households with current assets less than one-quarter of their annual income to see if there are significant differences from the research of Kaplan and Violante (2014) and Cui and Feng (2017).

2.4 Household wealth and consumption

Finally, this thesis considers housing assets as an asset needing special attention. The unique features of housing assets is mentioned by Berger et al. (2015), who outlines that housing assets can be consumed, invested, and mortgaged. Due to China's unique social and economic system, and based on Berger et al.'s (2015) perspective, the complex

"Chinese-style" of housing assets is worthy of specific research attention.[8] In short, different types of real estate assets have different holding costs, both explicit and implicit. For explicit costs, besides the different daily costs, the house price and relevant property tax for different types of houses are different. For implicit costs, the *hukou*[9] of residents is determined by the real estate type and the location of the real estate. The *hukou* of each household thereby decides whether each household is eligible for local nearby public education and the type of social welfare the household can receive.[10] As well as these "Chinese-style" elements of housing assets, a common worldwide issue is how housing is obtained. This might also be a very important point affecting consumption–income elasticity since housing owned by residents through inheritance or national policies cannot reflect the economic characteristics of households to a great extent, which may lead to discrepancies in the research results. As a result, the complexity of this context calls for further research.

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[8] Chinese houses can be divided into residential buildings and mixed commercial and residential buildings. Residential buildings have a service life of 75 years and mixed residential and commercial buildings have a service life of 40 years. Residents of mixed commercial and residential buildings cannot attend local public schools, and the prices of water and electricity are much higher than prices for other families.

[9] Since 1958, the *hukou* system has become a core Chinese socioeconomic institution. It divides residents into rural residents and urban residents.

[10] "China's Hukou System: What it is and How it Works" retrieved from: https://www.china-briefing.com/news/chinas-hukou-system/

3. Dataset and sample selection

As discussed in the literature review, most existing research uses macro data to study the relationship between consumption and assets. This study uses micro data, from the CHFS,[11] to explain the relationship between consumption and assets. The dataset and criteria for sample selection are presented below.

3.1 Dataset

The CHFS is a biennial tracking survey conducted by the China Household Finance Survey and Research Centre of Southwestern University of Finance and Economics. The survey is conducted in June every two years. The released data includes the years 2011, 2013, 2015, and 2017. The survey consists of three parts: a regional questionnaire, a household questionnaire, and an individual questionnaire.

This thesis uses CHFS data from 2015 and 2017. The survey started in 2011, but the sample size was just over 6,000 households in 2011, which made the early database unrepresentative. In addition, the questionnaire on households' economics and finances in the database was adjusted in the three surveys in 2011, 2013, and 2015, and those adjustments included addition or removal of variables and change of topic design. To ensure the consistency and reliability of the results, this study only selects the data from 2015 and 2017.

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[11] For more details, please refer to https://chfs.swufe.edu.cn

Two micro-level datasets are commonly used in research about China: the CHFS and the China Family Panel Study (CFPS)[12]. Compared to the CFPS, the CHFS has several advantages. The CHFS has a bigger sample size and wider sample distribution. In the 2017 survey, the CFPS covered 25 provinces and interviewed around 15,000 households and 30,000 individuals, while the CHFS covered 29 provinces and interviewed 40,011 households and over 120,000 individuals. Mainland China has 32 provincial administrative units, which have different cultural and living habits. The wider sample distribution and bigger sample size make the CHFS more representative than the CFPS. Moreover, the number and types of variables included in the dataset also play a role in the choice of dataset. There are around 2,100 variables in CFPS. In comparison, the CHFS has more than 3,400 variables, covering not only household economic information such as income, consumption, social security, and insurance, but also demographic and household behavioural characteristics. This large number of variables enables the survey to present a more comprehensive and accurate view of the economic information and demographic characteristics of households, creating greater scope for this thesis to choose the variables and offering better opportunities for developing this thesis for future research.

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[12] For more details, please refer to https://opendata.pku.edu.cn/dataverse/CFPS

3.2 Research sample selection

Research unit (household)

Since most countries and the existing literature (Cui & Feng, 2017; Hara et al., 2016; Kaplan et al., 2014; Song, 2020) consider the household as the consumer unit, this thesis also follows this practice. Some variables, such as wages and pension funds, are collected at the individual level. For consistency, those indicators at the individual level are transformed into the household level before undertaking the analysis. The definition of households in this study is the group of individuals who share income and expenditure.

Household sample selection

The steps for the data cleaning procedure follow Cui and Feng (2017). First, remove the households with outliers and incomplete data and those in which household heads are not between 18 and 100 years old; then, remove households with negative income and those in which total income is derived from self-employment.[13] After these steps, around 37,000 households remain. Since the CHFS has a y truncation procedure for the extreme values of income, consumption and debt, this thesis does not eliminate households with income and consumption in the first 5% and households in the last 5% of consumption. The CHFS also filters some low-quality entries (refuse to answer or have not completed all the questionnaires) from the database. The last step is to keep the same households for both years. In the end, 37,161 households were selected for 2015 and 2017 (see Table 1).

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[13] Self-employment: farmers are not included

Table 1 Criteria of sample selection from the CHFS

CHFS Year	2015	2017
Initial sample size	39,289	40,011
Exclusions		
(1) Missing income or wealth	2	0
(2) Not aged 18–100 years	97	102
(3) Negative income	368	267
(4) All income from self-employment	932	1052
(5) Low level of data quality	1	0
Sample size excluding above	37,889	38,590
Unable to match for two years	728	1429
Final sample size	37,161	37,161

3.3 Variable selection

When analyzing the effect of wealth on consumption, some studies focus on single assets (Mankiw & Zeldes, 1991; Skinner, 1989) and others consider more assets (Bayoumi & Edison, 2003; Cooper & Dynan, 2013). Variable selection in the consumer heterogeneity literature is more consistent. Given that this thesis focuses both on the wealth effect on consumption and consumer heterogeneity in China, the variable selection is based on Kaplan and Violante (2014).

3.4 Definition of variables

The following introduction to the selected variables explains what subsets the variable include, why the variable is chosen and how the variable is processed.

Consumption

Consumption is the dependent variable in empirical studies on both the wealth effect and consumer heterogeneity. Consumption includes expenses for daily necessities (food, water, electricity, entertainment, and transportation), education expenses, and medical expenses.

Due to the different timing of the CHFS's data collection on asset value and consumption, this study investigates the asset value of the current year and the consumption of the previous year. The lag period of this investigation may cause asset value fluctuations and consumption changes. Therefore, this thesis regards consumption as non-productive

consumption and deletes consumption that involves asset changes. If this study considered these two kinds of consumption at the same time, there may be a causal relationship with the independent variable. If this study considers daily consumption alone, it greatly reduces the possibility of randomness and model endogeneity. Since monthly data can depict the consumption per capita more precisely, consumption is recorded based on the monthly average of the previous year, while the recording unit of education expenses and medical expenses is the annual summary of the previous year. To deal with this inconsistency, first the monthly average consumption is converted into annual consumption by multiplying the monthly payment summary by 12, then the annual consumption of different subsets is added to get the annual non-productive consumption of each household.

Income

Income includes after-tax wages, public transfers (pension and government subsidies, such as one child incentives and unemployment benefits) and property income (rental income from housing and vehicles).

Income is an important variable that affects consumption. According to Keynes's absolute income hypothesis, household consumption is a function of current income, and household income is closely related to current consumption. Hall (1978) put forward the rational expectation–persistent income hypothesis. According to Hall 's theory, residents' consumption changes are random and unpredictable. At the same time, this study cannot simply assume that consumption is sensitive to current income due to a household's

marginal propensity to consume. Changes in current income are closely related to changes in permanent income, that is, changes in current income will lead to changes in consumers' future income. Since property income is an important part of household income and is closely related to household assets, this is also one of the important reasons why household assets affect consumption. Hand-to-mouth households have limited income to buy food and live on.

The process of calculating household income has similarities to consumption. Most subsets in income are in annual units, and only after-tax wage and pensions are recorded in monthly units.

Liquid assets

Household liquid assets consist of cash, savings, and financial products (stocks, bonds, funds, futures, gold, and other financial products). Kaplan and Violante (2014) classify assets as liquid assets and illiquid assets. They found that under normal circumstances, highly liquid assets have a lower realization cost and can be used to smooth consumption, while low liquidity assets have higher profitability and can improve the long-term level of wealth. Given the importance of asset liquidity for consumption (Carroll et al., 2011; Jappelli & Pistaferri, 2014), this thesis calculates the value of total liquid assets.

Illiquid assets

Illiquid assets in this thesis are defined as assets with low liquidity. They include pension accounts, insurance accounts, housing provident funds, durable assets (electrical

appliances, furniture, jewellery, and others) and vehicles. Some researchers also refer to

illiquid assets as non-financial assets. Illiquid assets usually include production projects,

vehicles, and other assets such as gold and silver jewellery, high-end clothing, and antiques.

In addition, some studies have confirmed that pension insurance, medical insurance, and

housing provident funds have an impact on residents' consumption behaviour (Blundell et

al., 2008; Liu Zilan & Chen, 2010). Therefore, in this study, pension insurance, medical

insurance, and housing provident funds are treated as illiquid assets, although they differ

from Kaplan and Violante's definition of illiquid assets. Due to the important position of

housing assets in Chinese household assets, this thesis analyzes housing assets separately

as an independent variable. The process of calculating illiquid assets is the same as for

liquid assets.

Housing assets

The housing asset variable includes the total value of places that can be used for living

or working (house, apartment, office). For Chinese households, housing is an important

asset. This study considers housing assets as an independent variable. Compared with

liquid assets and illiquid assets, housing assets have special characteristics. On the one

hand, Bostic et al. (2009) argued that housing has dual attributes, namely investment

attributes and consumption attributes, so the current rising housing prices are related to

investment rather than consumption. Households buy houses because they need a place to

live rather than for investment purposes. Due to several factors, such as property

transaction taxes and payment policy for house purchases, households do not buy and sell houses frequently, resulting in lower liquidity of housing assets than for stocks and higher realization costs. Some researchers (Caporale & Sousa, 2016; Chamon & Prasad, 2010; Muellbauer, 2007) show that with developments in the financial market and the introduction of financial products, housing assets can be more liquid than durable goods to some extent, and households can obtain cash in a short period through mortgage loans to smooth their consumption.

Moreover, in China, for example, Campbell and Cocco (2007) used the average house price of the area to replace the housing price provided by the respondents. This does have advantages, given the inability to measure the housing assets of renters. However, the increase in regional house prices will indeed affect consumption, and the regional average house price is closely related to the household's housing assets, although this leads to some problems for defining the variable. Only housing prices in cities can be identified, not housing prices in rural areas. The value of different houses in the same area may fluctuate, and the proportion of house assets in general households is very large, which makes it impossible to distinguish households in this area. Therefore, this thesis still uses the housing prices provided by the respondents in the CHFS as the standard data.

Other control variables

In addition to household assets, residential household consumption is also influenced by factors such as household member structure, age, education level of household head, occupation, and household registration (*hukou*).

Household head refers to the individual mainly responsible for financial resources or the leader of the family. The household demographic structure includes the number of permanent residents in the household. The age of the household head is denoted as age. Since increases in the age and education of the household head may have a non-linear effect on household consumption capacity, the squares of the age and education of the household head are introduced. Dummy variables are constructed for *hukou* status (household registration status, which may affect education, housing, welfare, and work of a household) as agricultural, non-agricultural, and no household registration. If a household is headed by a rural *hukou*, then the dummy variable Hukou is 1. If the household is headed by a non-rural *hukou*, then the dummy variable is 0. For instance, the medical insurance system for rural *hukou* is different from urban *hukou*, and social welfare is also different. Household registration can also roughly reflect whether a household lives in an urban or rural area.

Table 3 shows the mean value of household consumption in 2017 was 59,334 yuan, an increase of 1,819 yuan compared to 2015. Both the mean and median show that, between 2015 and 2017, income growth was significantly faster than consumption growth, which

is consistent with the relevant reports. In 2017, the average household illiquid assets and housing assets were higher than in 2015. The liquid assets in 2017 were smaller than in 2015, mainly due to a decrease in financial products held by households. Usually, illiquid assets held by Chinese households are significantly higher than liquid assets. Data also shows that housing assets are the most important assets of Chinese households. Comparing the median and average of assets shows that there is a huge gap in assets owned by different Chinese households. Considering family demographics, the average length of education of the family was 13.43 years in 2015 and 13.46 years in 2017, with no drastic change. The average household size was 3.67, and the average age of the household head was 55.75 years in 2017. Most Chinese household heads are men, and more than half of Chinese household heads have urban *hukou*.

Table 2 Variable definitions

Variables (Year)	Variable description
Income (year)	Wage + subsidy + property income
Consumption (year)	Nonproductive expenditure
Illiquid assets	Durable assets + fixed assets + cars
Durable assets	Electrical appliances + furniture + jewellery + other
Fixed assets	Housing provident fund + pension and insurance account
Car	Value of vehicles, motorcycles
Liquid assets	Savings + financial products + debit other
Savings	Cash + checking and savings accounts
Financial product	Stock + bonds + other financial products
Debit other	Total value lent by household
Housing assets	Total value by house
Total debt	Mortgage + credit card + other debt
Mortgage	
Credit card debt	
Gender	Gender of the household head (Female: 1, male: 0)
Family size	Total household size
Hukou	Household head (Rural: 1, Urban: 0)
Age	Age of the household head
Education	Years of education of the household head

Table 3 Summary statistics of variables

Variables (in RMB)	Mean		St. Dev		P1[14]		P25		Median (P50)		P75		P99	
Year	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017	2015	2017
Income (year)	68,486	84861	150,231	183,101	0	0	11,300	19,490	39,438	51,296	78,000	97,800	465,400	634,086
Consumption (year)	53,011	57,515	64,569	63,859	4,504	4,051	20,740	22,744	37,140	40,900	61,928	68,402	325,440	304,640
Illiquid assets	86,541	76,507	460,957	217,621	0	0	701	151	10,019	5,500	70,160	75,200	1,210,000	956,100
Durable assets	28,621	17,221	421,324	400,310	0	0	500	100	10,000	10,000	23,595	28,000	611,064	1,000,000
Fixed assets	10,596	16,760	32,221	96,703	0	0	0	0	200	394	3,220	6,000	165,345	240,000
Car	20,696	28,409	82,263	87,851	0	0	0	0	0	1,500	0	12,500	300,000	352,000
Liquid assets	66,205	69,027	329,515	239,842	0	0	1,000	1,100	6,000	7,078	35,000	40,800	955,000	1,024,318
Savings	53,916	51,547	158,996	149,725	0	0	1,000	1,010	7,447	6,500	35,000	40,000	520,000	600,000
Financial product	18,581	24,811	249,574	173,501	0	0	0	0	0	0	0	0	502,500	550,000
Debit other	10,830	11,151	96,663	88,604	0	0	0	0	0	0	0	0	200,000	200,000
Housing assets	554,483	727,706	1,057,930	1,528,102	0	0	60,000	33,716	200,100	220,000	591,916	670,000	5,144,705	8,000,000
Total debt	41,185	56,577	188,024	241,820	0	0	0	0	0	0	10,000	20,000	600,000	900,000
Mortgage	23,344	36,188	113,590	162,348	0	0	0	0	0	0	0	0	460,000	655,000
Credit card debt	493	1,043	8,151	12,382	0	0	0	0	0	0	0	0	10,000	20,000
Gender	0.187	0.218	0.43	0.405	0	0	0	0	0	0	1	1	1	1

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[14] P1 indicates how the lowest 1% households exhibit in different variables, P25, P50, and P75 indicate similar meaning.

Family size	3.17	3.57	1.7	1.552	1	1	2	2	3	3	5	4	9	8
Hukou	0.558	0.56	0.498	0.499	0	0	0	0	1	1	1	1	1	1
Age	55.75	53.92	14.35	14.23	24	24	43	45	53	55	63	65	85	86
Education	7.65	8.19	4.4	4.37	0	0	6	6	9	9	9	12	16	16

4. Empirical studies

4.1 Wealth effect

4.1.1 Methodology

As discussed in the literature review section, consumption is affected by asset price, asset quantity, and savings, called the "wealth effect". To verify whether the wealth effect exists in China, the following empirical model is constructed.

i. Model

$$Log\ (C_{t,j}) = \alpha_t + \beta_{1t}\ Log(Liquidasset_{t,j}) + \beta_{2t}\ Log(Illiquidasset_{t,j}) +$$

$$\beta_{3t}\ Log(Income_{t,j}) + \beta_{4t}\ Log(House_{t,j}) + \sum_{j=1}^{J} Controli_{t,j} + e_{t,j} \qquad (1)$$

t= 2015-2017; j denotes households, J= Total number of households

where $Log(C_{t,j})$, $log(Liquidasset_{t,j})$, and $log(Illiquidasset_{t,j})$ represent liquid assets and illiquid assets, respectively; the specific coverage is explained in detail later. If the wealth effect does exist, then β_{1t}, β_{2t}, β_{3t} should be positive. $ln\_Income_{t,j}$ represents household income (in log), which is the most important control variable affecting residents' consumption. In theory, an increase in household income will increase household consumption. $Controli_{tj}$is a vector of control variables that can potentially affect household j's consumption, and e_{tj}. is the error term.

Separate cross-section estimations are carried out for 2015 and 2017 since pulling both years together and estimating a panel regression in level would require assuming that the

dependent variable is stationary. Even if that were the case, due to inertia in consumption,

a lagged dependent variable would have to be included as an explanatory variable and

consequently the model could only be estimated for 2017.

4.1.2 Baseline regression for wealth effects

For cross-section data, this thesis uses the 2015 and 2017 datasets to run the regression.

Results are summarized in Table 4.

Table 4 Wealth effect regression results for 2015 and 2017

Variables	Prediction	$Log(C_{t,j})$	
		(1)	**(2)**
		2015	**2017**
Log(Income)	+	0.038***	0.040***
		(21.23)	(19.81)
Log(Liquidasset)	+	0.051***	0.046***
		(31.62)	(32.57)
Log(Illiquidasset)	+	0.118***	0.115***
		(46.03)	(42.54)
Log(House)	+	0.007***	0.006***
		(7.38)	(6.52)
Age	+	-0.020***	-0.012***
		(-11.81)	(-7.43)
Age^2	+	0.000***	0.000***
		(7.45)	(2.81)
Edu	+	0.465***	0.096***
		(20.17)	(9.74)

Edu^2	+	-0.035***	-0.005***
		(-10.48)	(-4.19)
Hukou	+	-0.292***	-0.344***
		(-33.74)	(-42.01)
Gender	+	0.039***	0.025***
		(4.62)	(2.88)
Family size	+	0.111***	0.019***
		(43.68)	(4.43)
Constant	+	8.240***	8.720***
		(131.57)	(160.36)
Observations		37,140	37,140
R-squared		0.449	0.419

Robust t-statistics in parentheses. *** *p*-value<0.01, ** *p*-value<0.05, * *p*-value<0.1.

The regression results in Table 4 show that although β_{1t}, β_{2t}, β_{3t}, β_{4t} have changed, the changes are small, and all are significant. This shows that liquid assets, illiquid assets, and housing assets all contribute significantly to the wealth effect. Although, unlike this thesis, no other research has classified assets into liquid and illiquid assets, the wealth effect of the housing asset has been verified in several studies (Bayoumi & Edison, 2003; Bostic et al., 2009; Skinner, 1989; Starr-McCluer, 2002).

The wealth effect of illiquid assets is the most significant of all the assets in both 2015 and 2017. In 2017, every 1% increase in the illiquid assets of Chinese households is associated with an increase in household consumption of 0.12% (β_{3t}=0.115). In theory, the rate of return of illiquid assets is higher than the rate of return of housing assets and liquid

assets. The higher rate of return might increase the expectation of future income and thus affect consumption positively. Hall (1978) suggested that household consumption increases consumption because of an increase in future income expectations. The coefficients β_{1t} and β_{3t} are close in value, meaning that changes in income and in liquid assets affect consumption similarly. In 2017, a 1% increase in liquid assets increases consumption by 0.046% and a 1% increase in income of households increases consumption by 0.04%.

Although many studies (Ludvigson & Steindel, 1999; Mankiw & Zeldes, 1991) have shown that the wealth effect of financial products such as stocks is very significant, the wealth effect of liquid assets contributed by financial products is not as significant as expected because few Chinese households hold financial assets. Therefore, the wealth effect of liquid assets is mainly contributed by savings.

The wealth effect of housing assets is the weakest, and housing asset has the least impact on consumption. In 2017, every 1% increase in housing asset increases household consumption by 0.006% (β_{4t} =0.006). The reason for this small effect is that the consumption attribute of housing is higher than the investment attribute for Chinese households. In other words, regardless of how large is the change in house price, fewer Chinese households have houses they can sell. Another possible explanation is the relationship between saving and borrowing. Cooper and Dynan (2013) found that housing

assets would affect consumption of households with borrowing needs, but not the consumption of households without borrowing needs. The high saving rate of Chinese households limits the borrowing demand of Chinese households, thus keeping the impact of housing assets on consumption at a low level.

Of the control variables, *hukou* has the most significant effect. The consumption of rural *hukou* households is significantly lower than that of non-rural *hukou* households. Non-rural household heads have better benefits in terms of medical care, education, and retirement benefits, so these households tend to have less motivation to stabilize consumption than rural households. There is no doubt that the cost of living in urban areas is higher than in rural areas. Household head education and female household heads have a positive impact on consumption. Although the coefficient of the age of the household head is negative, it has little impact on consumption. The most striking finding is that regarding the relationship between household size and consumption. A positive relationship would be expected between household size and consumption. However, in 2015 and 2017, the two coefficients for household size were negative (although the p value in 2015 was greater than 0.05, which is not significant). This requires further study.

4.1.3 Robustness check

To further test whether each asset has a "wealth effect", the model commonly used in the literature (Campbell & Cocco, 2007) is used to test the robustness of the baseline regression.

$$\Delta Log(C_{t,j}) = \alpha_t + \beta_1 \Delta Log(Income_{t,j}) + \beta_2 \Delta Log(Illiquidasset_{t,j}) +$$

$$\beta_3 \Delta Log(Liquidasset_{t,j}), + \beta_4 \Delta Log(House_{t,j)} + \sum_{j=1}^{J} Controli_{t,j} + e_j \qquad (2)$$

where, for example, $\Delta Log\ C_{t,j} = Log\ C_{2017,j} - Log\ C_{2015,j}$

The robustness regression controlled for the growth rate in income, liquid assets, illiquid assets, and housing assets. It can be concluded that liquid assets, illiquid assets, and housing assets all have significant wealth effects, as shown in Table 5. The coefficient for liquid assets is larger in magnitude than the coefficients for other assets. The results are consistent with the previous baseline regression results.

Table 5 Regression results for the model in changes

Variables	$\Delta Log(\ C_{t,j})$ **Wealth effect**
ΔLog (Income)	0.053***
	(28.15)
ΔLog (Illiquidasset)	0.062***
	(41.47)

ΔLog(Liquidasset)	0.139***
	(55.47)
ΔLog(House)	0.008***
	(8.72)
Age (2017)	-0.013***
	(-5.49)
Age^2 (2017)	0.000***
	(2.87)
Edu (2017)	0.073***
	(5.00)
Edu^2 (2017)	-0.004**
	(-2.47)
Hukou (2017)	-0.307***
	(-24.53)
Gender (2017)	0.026*
	(1.93)
Family size (2017)	0.100***
	(26.55)
Constant	0.266***
	(3.66)
Observations	36,776
R-squared	0.375

Robust t-statistics in parentheses. *** p-value<0.01, ** p-value<0.05, * p-value<0.1.

4.1.4 Heterogeneity analysis

According to the life cycle theory, changes in asset value have varying degrees of impact on individual consumption at different ages. Campbell and Cocco (2007) emphasized this heterogeneous aspect, and found that the greater the age, the greater the

individual's "wealth effect". This is because the older the individual, for the same degree of asset appreciation, the shorter the expected future life span and the less time for the elderly to distribute appreciation gains, which will increase the extent of consumption, thus increasing the wealth effect. To explain this age heterogeneity, I first grouped the different households according to the age of the household head, following Qiao's (2018) method, according to which the households are divided into five groups by age of the household head: less than 30 years old, 30–39, 40–49, 50–59, and over 60 years old.

For economic variables, the regression results in Table 6 show that the older the household head, the smaller the wealth effect of liquid assets, which is not consistent with Campbell and Cocco's (2007).

Considering the reason for this phenomenon, in Chinese traditional culture, thrift is a virtue and older Chinese people tend to be thriftier.[15] Sun and Huang (2010) concluded there is a strong willingness for transfer payments from older members to younger members in Chinese households. In other words, instead of their own consumption, older groups are more likely to help the younger household members financially.[16] Moreover, for the wealth effect for older groups, the breadth and depth of social endowment insurance coverage also needs to be considered. As a result, this apparent inconsistency is reasonable in the Chinese context and further research is needed to explore this phenomenon.

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[15] News from CGTN, see https://news.cgtn.com/news/3d3d414f3167544e78457a6333566d54/share_P-HtMl
[16] Article from Forbes, see https://www.forbes.com/2010/02/02/china-saving-marriage-markets-economy-trade.html?sh=2e25cec37a83

The wealth effect of housing assets has small changes among different age groups, rising first then falling, showing an inverted U-shaped distribution. This changing trend may be caused by credit constraints. Research by Ying et al. (2015) shows that, in China, the age of the household heads has an inverted U-shaped impact on credit constraints. Therefore, it is difficult for young people and the elderly to obtain loans through mortgage housing, resulting in poor liquidity of housing assets.

Hukou is significant among all age groups, with the rural households tending to have less consumption. This is also consistent with the baseline regression results. At the same time, the impact of *hukou* on consumption shows an inverted U-shape according to age groups. The consumption of households with the head aged 40–50 years is the most affected by *hukou*. The results also show that the older the household, the more significant the impact of household size on consumption. Similarly, the education level of the household head is significantly positively correlated with consumption. The impact of the length of education of the household head on consumption is little affected by the age group. Moreover, the older the household head, the greater the impact of household head education on consumption.

In order to broaden the scope of the heterogeneity analysis, households are further divided into low-income, middle-income, and high-income groups based on the total income of the household.[17] The results show that households with different incomes do

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[17] Households are ranked according to household income. The lowest one-third are low-income households, the middle one-third are middle-income households, and the highest one-third are high-income households.

have different wealth effects. Household income has a positive impact on the wealth effect of liquid assets and illiquid assets. The wealth effect of housing assets decreases gradually with the increase of the household head's income.

Of the demographic characteristics of households, with the rise of household income, the impact of household size on consumption shrinks. Like household size, the impact of *hukou* on consumption decreases with the increase of income. Within different income groups, household head gender has the most significant effect on the wealth effect, and higher consumption is associated with female household heads who have higher income. However, the years of education of the household heads in different income groups have less effect on consumption.

Table 6 Heterogeneity analysis in wealth effect 2017

Variables	Household Group classified by Age (2017)					Group classified by Income (2017)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(18–29)	(30–39)	(40–49)	(50–59)	(60–100)	Low	Mid	High
	1705	4073	8153	9030	13836	12378	12378	12378
Log(Income)	0.029***	0.059***	0.034***	0.032***	0.040***	-0.001	0.182***	0.262***
	（3.74）	（8.52）	（8.23）	（9.49）	（11.92）	（-0.49）	（8.27）	（23.37）
Log(Illiquidasset)	0.067***	0.057***	0.047***	0.036***	0.078***	0.035***	0.037***	0.043***
	（10.10）	（13.09）	（15.65）	（13.18）	（17.36）	（14.84）	（16.88）	（16.72）
Log(Liquidasset)	0.146***	0.148***	0.143***	0.129***	0.038***	0.099***	0.083***	0.104***
	（12.82）	（18.84）	（25.54）	（23.17）	（19.00）	（21.10）	（19.59）	（22.25）
Log(House)	-0.009***	-0.005*	0.003	0.011***	0.011***	0.007***	0.001	0.001
	（-3.62）	（-2.52）	（1.74）	（5.90）	（8.02）	（4.90）	（1.41）	（0.44）
Gender (2017)	0.107***	0.003	0.031	0.030	-0.006	-0.026	0.039***	0.058***
	（3.21）	（0.12）	（1.68）	（1.68）	（-0.44）	（-1.60）	（2.94）	（4.13）
Education (2017)	0.000***	0.001***	0.002***	0.002***	0.005***	0.008***	0.001***	0.000***
	（0.98）	（3.08）	（5.58）	（2.04）	（11.30）	（16.41）	（7.47）	（9.31）

Education-squared (2017)	0.002*** （2.89）	0.005*** （7.38）	0.006*** （11.30）	0.006*** （9.79）	0.008*** （15.14）	0.010*** （12.31）	0.004*** （8.57）	0.004*** （10.31）
Family size (2017)	0.032 (2.74）	0.052 （6.74）	0.077*** （12.56）	0.104*** （22.14）	0.156*** （35.97）	0.164*** （31.15）	0.076*** （17.94）	0.045*** （10.84）
Hukou (2017)	-.0350*** （-1.07）	-.046*** （-1.96）	-0.158*** （-9.73）	-0.324*** （-21.03）	-0.615*** （-45.34）	0.421*** (-29.16）	-0.313*** （-23.89）	-0.235*** (-17.42)

Robust t-statistics in parentheses. *** *p*-value<0.01, ** *p*-value<0.05, * *p*-value<0.1.

4.2 Hand-to-mouth effect

Hand-to-mouth households are an important group in China. Different types of hand-to-mouth households have different effects on the relationship between consumption and assets.

4.2.1   Methodology

Definition of hand-to-mouth

Following Kaplan and Violante's (2014) definition, this thesis identifies wealthy-hand-to-mouth and poor-hand-to-mouth households in the data using the following strategy. Let y_{jt}[18] denote the income of household j in period t. This thesis not only follows the definition of Kaplan and Violante (2014), which sets period t as one month, but also adds a quarterly group for comparison,[19] as the quarterly data is more suitable for Chinese households. Moreover, m_{jt} denotes net liquid wealth (liquid assets minus credit card debt) and n_{jt} denotes net illiquid wealth (illiquid assets minus other debt).

There are two steps to defining hand-to-mouth households. The first step is to see if a household's n_{jt} is equal to or less than half of its income in a pay period. Based on this,

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[18]   The income in the data is the annual income, so the monthly income is expressed as 1/12 of the annual income and quarterly income is expressed as 1/4 of the annual income.

[19]   Paxson (1993) found that the income and expenditure of Thai households have obvious seasonality, which is due to preference rather than liquidity constraints. Therefore, one can assume that the household consumption decision in Thailand is made on a quarterly basis. Similar to Thailand, China has many families who rely on seasonal agriculture for income, so assume that Chinese families may make consumption decisions not on a monthly basis but on a quarterly basis (Paxson, 1993).

households are defined as hand-to-mouth households (if a household has negative liquid assets, they are also considered a hand-to-mouth household). The rest of the households are non-hand-to-mouth households.

$$\text{HtM} = 1 \text{ if } m_{jt} \le \tfrac{1}{2}y_{jt} \text{ or } m_{jt} \le 0$$

$$\text{HtM} = 0 \text{ otherwise}$$

$$\text{Non-HtM1 if } m_{jt} > \tfrac{1}{2}y_{jt}$$

$$\text{Non-HtM} = 0 \text{ otherwise}$$

The second step is to define whether the hand-to-mouth households are poor or wealthy depending on n_{jt}. If n_{jt} is equal to or less than zero, the household is defined as poor. If not, the household is defined as wealthy.

$$\text{W-HtM} = 1 \text{ if } m_{jt} \le \tfrac{1}{2}y_{jt} \ \& \ n_{jt} > 0 \text{ or } m_{jt} \le 0 \ \& \ n_{jt} > 0$$

$$\text{W-HtM} = 0 \text{ otherwise}$$

$$\text{P-HtM} = 1 \text{ if } m_{jt} \le \tfrac{1}{2}y_{jt} \ \& \ n_{jt} < 0 \text{ or } m_{jt} \le 0 \ \& \ n_{jt} < 0$$

$$\text{P-HtM} = 0 \text{ otherwise}$$

Shares of different hand-to-mouth households and robustness check

Table 7 shows the proportion of wealthy-hand-to-mouth households and poor-hand-to-mouth households in the total number of households in 2015 and 2017. The data is divided into two groups to define the household. The first group is consistent with Kaplan and Violante (2014), which is the households using months as the decision-making cycle of consumption and income. The second group is Chinese households that make decisions on a quarterly basis. However, regardless of which standard is used, it is clear that the total number of hand-to-mouth Chinese households increased from 2015 to 2017, which is consistent with the decline in liquid assets held by Chinese households and the increase in income shown in Table 7.

The results of identifying hand-to-mouth households according to the standards of Kaplan and Violante (2014) are similar to the research results for developed countries. About 20% of the total households in China are hand-to-mouth households, and most of them are wealthy-hand-to-mouth households. If identified by quarter as the decision-making cycle, hand-to-mouth households are about half of the total households, while wealthy-hand-to-mouth households are still the vast majority of hand-to-mouth households.

Table 7 Shares of hand-to-mouth households in 2015 and 2017

Year	Percentage in total population			
	(1)	(2)	(3)	(4)
	2015	2017	2015	2017
Variable	Kaplan and Violante's (2014) monthly classification		Quarterly classification	
W-HtM	19.30%	23.10%	43.48%	46.55%
P-HtM	1.30%	2.70%	4.47%	7.52%
Non-HtM	79.04%	74.20%	52.15%	45.93%

To ensure the robustness of this grouping, households of different ages and incomes were grouped and identified according to the identification criteria of Kaplan and Violante (2014), to check the impact of household head age and household income on the classification proportion of hand-to-mouth households (Figure 3).

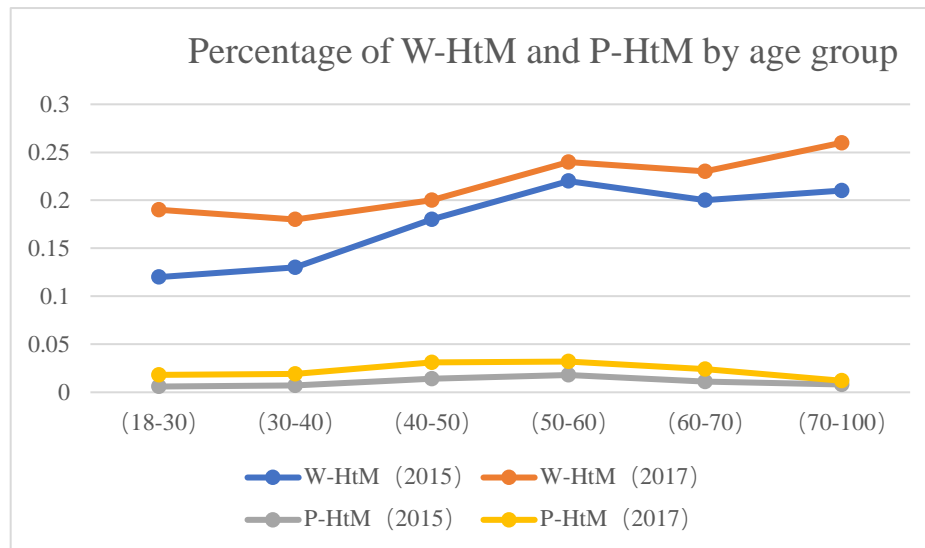Figure 3 Percentage of W-HtM and P-HtM by age of household head group

Figure 3 shows that the older the group of household heads, the higher the proportion of W-HtM households of total households. This shows that young people have more desire to save, which is consistent with the life cycle theory. The proportion of P-HtM households in the population is low and the change from 2015 to 2017 is not obvious.

Figure 4 Percentage of W-HtM and P-HtM by household income group
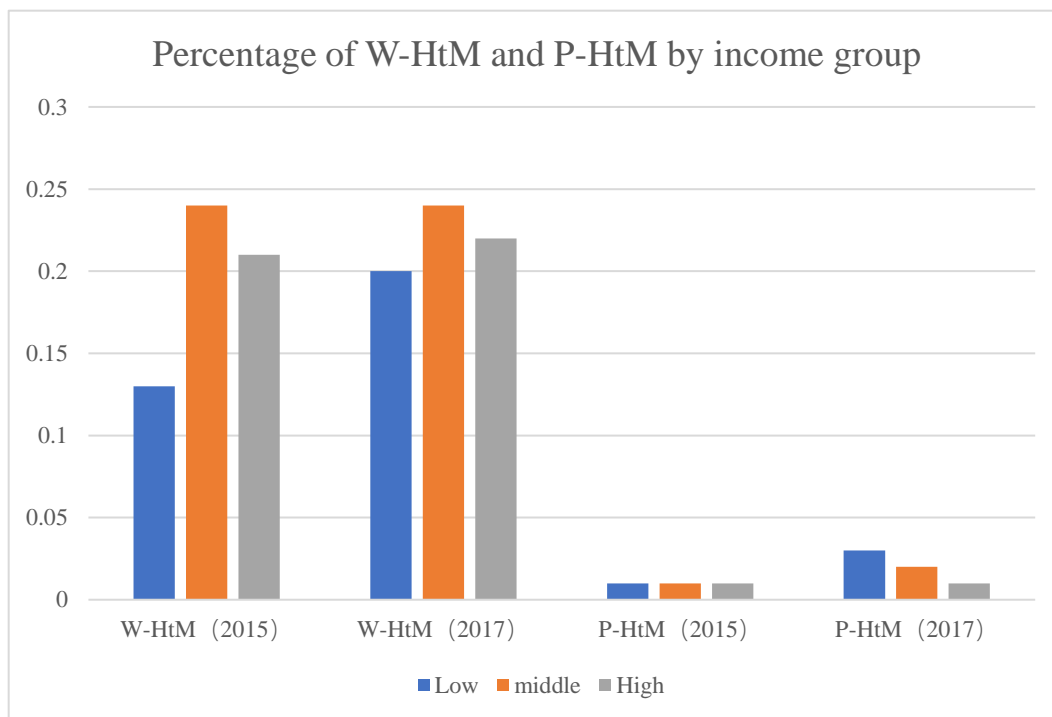
The proportion of W-HtM households in the middle-income group is the highest, while the proportion of low-income households is the lowest (Figure 4). There is no obvious pattern for P-HtM households.

Formula

After selecting the sample, referring to Cui and Feng (2017), this thesis uses the

formula below to run the OLS regression.

$$Log（C_{t,j}）= \alpha_t + \gamma_{1t}(WHtM_{t.j} \times Log(Income_{t,j})) + \gamma_{2t}(PHtM_{t,j} \times$$

$$log(Income)) + \gamma_{3t}WHtM_{t,j} +$$

$$\gamma_{4t}PHtM_{t,j}+\gamma_{5t}Log(Income_{t,j})+\sum_{j=1}^{J} Controli_{t,j} + e_{tj} \qquad (3)$$

where $Log（C_{t,j}）$ and $Log(Income_{t,j})$ are the logarithms of consumption and

income. P-HtM and W-HtM are the dummy variables of P-HtM-family and W-HtM-family.

$Controli_{tj}$ represents other control variables, including the gender, age, educational

background, and household registration type of household heads.

4.2.2 Baseline regression results for hand-to-mouth households

The coefficients of $(WHtM_{t,j} \times Log(Income_{t,j}))$ and $(PHtM_{t,j} \times$

$Log(Income))$ represent the hand-to-mouth effect, which is indicated in γ_{3t} and γ_{4t}.

$(\gamma_{1t}+\gamma_{5t})$, $(\gamma_{2t} + \gamma_{5t})$ and γ_{5t} represent the consumption–income elasticity of W-

HtM, P-HtM and non-HtM households. Since Kaplan and Violante (2014) theoretically

proved that the consumption–income elasticity for P-HtM and W-HtM households should

be greater than that of non-HtM households, the results should be $\gamma_{1t} > 0$ and $\gamma_{2t} > 0$.

Table 8 Baseline regression for hand-to-mouth households 2015 and 2017

Variables	Kaplan and Violante (2014) Monthly decision		Quarterly decision	
	(1)	(2)	(3)	(4)
	2015	2017	2015	2017
Log(Income)	0.157***	0.079***	0.157***	0.071***
	(38.27)	(30.86)	(35.48)	(28.94)
W-HtM	-0.445***	-0.486***	-0.771***	-1.247***
	(-4.01)	(-5.26)	(-9.70)	(-15.74)
P-HtM	0.227	-0.023	-0.914***	-0.974***
	(0.55)	(-0.14)	(-4.23)	(-6.56)
Log(Income*W-HtM)	0.016	0.024***	0.047***	0.092***
	(1.50)	(2.77)	(6.12)	(12.60)
Log(Income*P-HtM)	-0.031	-0.025	0.061***	0.068***
	(-0.75)	(-1.57)	(2.93)	(4.83)
Age	-0.011***	-0.010***	-0.012***	-0.010***
	(-4.11)	(-6.37)	(-4.41)	(-6.52)
Age-squared	0.000	0.000***	0.000	0.000***
	(0.77)	(2.66)	(1.17)	(3.11)
Education	0.099***	0.227***	0.083***	0.204***
	(7.29)	(23.88)	(6.18)	(21.43)
Edu-squared	-0.003**	-0.009***	-0.003*	-0.008***
	(-2.24)	(-8.78)	(-1.85)	(-7.57)
Hukou	-0.263***	0.000	-0.263***	0.000
	(-23.61)	(1.46)	(-24.01)	(1.27)
Gender	0.031***	-0.103***	0.033***	-0.104***
	(2.82)	(-12.28)	(3.03)	(-12.61)
Family size	0.084***	0.113***	0.081***	0.106***
	(26.81)	(44.62)	(25.96)	(40.95)

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Constant	9.066***	9.357***	9.214***	9.598***
	(106.86)	(182.04)	(107.16)	(187.73)
Observations	37,140	37,140	37,140	37,140
R-squared	0.301	0.306	0.315	0.324

Robust t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

In Columns 1 and 2 of Table 8, using Kaplan and Violante's (2014) monthly decision cycle basis, Log (Income)*W-HtM is not significant for 2015 (γ_{1t}=0.016, p>0.05), while it is significant for 2017 (γ_{1t}=0.024, p<0.05). γ_{2t} is not significant in both years. In Columns 3 and 4, both γ_{1t} and γ_{2t} are significant in both years, and the γ_{2t} for 2015 and 2017 is close. Although this thesis cannot explore the fluctuation range of γ_{1t} due to the lack of longer time series data, these results compared to the results from the monthly base justify the assumption of the possible advantages of using the quarterly cycle. The coefficients of other household demographic variables are similar. The age of household heads has a negative impact on consumption, but this impact is small. Household size and the education years of the household heads have a positive impact on consumption. There are significant differences in the impact of the gender of the household heads on HtM households. Female household heads have a positive impact on W-HtM households' consumption and a negative impact on P-HtM households' consumption.

4.3 The wealth effect on hand-to-mouth households

This section adopts the formula in Section 4.1 to explore the wealth effect of W-HtM, P-HtM, and non-HtM households and how it varies based on data from 2015 and 2017.

$$Log\ C_{t,j} = \alpha_t + \beta_{1t}\ Log\ (Liquidasset_{t,j}) + \beta_{2t}\ Log(Illiquidasset_{t,j}) +$$

$$\beta_{3t}\ Log(Income_{t,j}) + \beta_{4t}\ Log(House_{t,j}) + \sum_{j=1}^{J} Controli_{t,j} + e_{tj} \qquad (4)$$

t=2014, 2016; j denotes households, J= Total number of households

4.3.1   Empirical results

As the results in Table 11 show, the annual change of wealth effect of HtM households is small, which is the same as the wealth effect of all households in Section 4.1. The liquid assets of W–HtM households and P-HtM households is significantly lower than that of non-HtM households, which indicates that W-HtM households and P-HtM households in China are not sensitive to the change of liquid assets. The HtM households have high consumption–income elasticity. The consumption–income elasticity of W-HtM households and P-HtM households is significantly greater than that of non-HtM households, which further verifies the previous relevant theories and research (Kaplan et al, 2014).

The illiquid assets of these three kinds of households are very similar, and there is no significant difference. Although the regression results of P-HtM households on housing assets are not significant, the regression coefficients of income, liquid assets, and illiquid assets are very close to W-HtM, which shows that whether net illiquid wealth is greater than zero will not change the wealth effect of households' assets.

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In addition to income, the results show that the wealth effect of HtM households' liquid assets is significantly greater than that of non-HtM households. There may be many of these phenomena. The HtM households have few liquid assets, so they fluctuate less than consumption, resulting in a higher wealth effect. These households have a high liquid asset wealth effect, which leads to more consumption after the increase of liquid assets, and these households cause the decrease of liquid assets when consuming.

Table 9 Baseline regression results for the wealth effect of HtM households in 2015 and 2017

Variables	W-HtM		P-HtM		Non-HtM	
	(1)	(2)	(3)	(4)	(5)	(6)
	2015	2017	2015	2017	2015	2017
Log(Income)	0.078***	0.050***	0.045**	0.043**	0.027***	0.027***
	(10.67)	(9.59)	(2.45)	(2.12)	(14.47)	(12.55)
Log(Liquidasset)	0.018***	0.023***	0.010	0.023**	0.100***	0.107***
	(5.26)	(9.02)	(0.79)	(2.27)	(38.32)	(42.93)
Log(Illiquidasset)	0.100***	0.096***	0.061***	0.082***	0.119***	0.110***
	(18.81)	(17.97)	(4.28)	(4.53)	(39.56)	(35.20)
Log(Houseasset)	0.026***	0.010***	0.005	-0.005	0.006***	0.004***
	(8.41)	(5.14)	(0.72)	(-0.78)	(5.50)	(3.87)
Familysize	-0.004	0.107***	0.127***	0.081***	-0.002	0.114***
	(-0.42)	(21.07)	(4.20)	(4.47)	(-0.43)	(38.62)
Age	-0.010**	0.002	-0.003	-0.022	-0.017***	-0.014***
	(-2.06)	(0.45)	(-0.23)	(-1.25)	(-9.50)	(-8.23)
Education	0.026***	0.007***	0.003	0.007**	0.026***	0.004***
	(9.75)	(9.71)	(0.38)	(2.03)	(20.61)	(14.17)
Gender	-0.014	-0.011	0.003	0.007	0.040***	0.030***
	(-0.64)	(-0.56)	(0.04)	(0.10)	(4.35)	(3.08)

Hukou	-0.350***	-0.429***	-0.247***	-0.284***	-0.285***	-0.308***
	(-17.47)	(-24.27)	(-3.64)	(-3.82)	(-29.77)	(-34.41)
Constant	8.597***	8.764***	9.425***	9.809***	8.598***	8.570***
	(57.23)	(71.64)	(28.15)	(19.61)	(153.76)	(149.21)
Observations	7699	8207	779	848	28662	27742
R^2	0.313	0.358	0.241	0.201	0.443	0.484

Robust t-statistics in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

5. Conclusion

5.1 Summary and contribution

The relationship between assets and consumption has been an important topic in research and practice. Due to the different liquidity among different assets, the impact of these assets on consumption is not the same. The impact of assets on consumption is mainly reflected in two aspects. First, several studies have demonstrated that assets have a wealth effect. That is, changes in household assets have an impact on consumption. Second, because of the different asset structures of households, there are differences in household consumption habits, that is, the hand-to-mouth effect. Relevant studies show that hand-to-mouth households have higher consumption–income elasticity. However, previous related studies have tended to focus only on the wealth effect of a particular type of asset of Chinese households and even less on Chinese hand-to-mouth households. This thesis is the first to examine both the wealth effect and the hand-to-mouth effect for Chinese households. At the same time, some studies on Chinese household consumption are limited to taking a theoretical approach due to data constraints, while some empirical studies based on macro data face serious endogeneity problems. This thesis, based on detailed micro-level household survey data, studies both the wealth effect and the hand-to-mouth effect of Chinese households.

There are four main contributions of this thesis. First, household assets were classified into liquid assets, illiquid assets, and housing assets according to their liquidity. Illiquid assets have the most significant wealth effect. Since illiquid assets have a higher rate of return than liquid assets, households will increase their consumption because of the increase of high-return assets and raise their expectation of future income. The wealth effect of liquid assets is very similar to the effect of income growth on consumption. This may explain why the main liquid assets of Chinese households are bank deposits and cash, while income tends to enter households in the form of bank deposits and cash. Some studies suggest that financial assets represented by stocks have a strong wealth effect, but this is not reflected in the wealth effect of Chinese households' liquid assets. This may be due to the underdeveloped financial market in China as, based on relevant household data, the proportion of total Chinese households with equity accounts is low. The very weak wealth effect of housing assets suggests that for an average Chinese household, housing is more important as a "consumer good" and very weak as an "investment good". This indicates that an increase in housing prices does not help to increase the consumption of Chinese households.

Second, this thesis analyzed the wealth effect for household heterogeneity and distinguished households based on age of household head and income. The results show that an increase in housing assets causes a decrease in consumption for households with a household head aged 18–30 years, while the difference is not significant for the other five

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age groups of household heads. Income fluctuations have a greater impact on households with a head aged 30–40 years old than on other households. The analysis of household grouping based on income differences shows that low-income households are the most sensitive to changes in housing assets. Among the demographic variables of interest, the most significant effect is household head *hukou*, with households headed by rural *hukou* consuming less than those with non-rural *hukou*. The relationship between the age of the household head and consumption is negative. Consumption tends to be higher for households with female heads and for households in which the head has more years of education.

Third, this thesis uses Kaplan and Violant's (2014) theory to distinguish households by the relationship between their liquid asset holdings and their income over time to classify them into hand-to-mouth households and non-hand-to-mouth households, and the size of the sum of net illiquid assets and net housing assets to determine whether the household is wealthy or not. This thesis also expands Kaplan and Violant's research by designing a set of hand-to-mouth identification criteria for quarterly consumption decisions to compare with Kaplan's criteria. This is because household income may be affected by seasonal changes, and some large expenditures may also be paid quarterly (such as tuition fees), hence some households may make consumption decisions by the quarter. The empirical results show that hand-to-mouth households have high income–consumption elasticities under both sets of identification criteria, which is consistent with Kaplan and Violant's

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findings. This supports previous findings that highly liquid assets have an important role in smoothing consumption in Chinese households, revealing that there is an impact of asset realization costs and rates of return on consumption costs in China. On the other hand, the results show that the hand-to-mouth household identification criterion of quarterly consumption decisions is more consistent with Kaplan and Violant's description of hand-to-mouth households, implying that Chinese households may prefer to use a quarterly decision-making cycle. A robustness analysis tested the results. In addition, household ownership of inherited housing and household ownership of policy housing reduces the probability of a household being a poor-hand-to-mouth household and increases the probability of being a wealthy-hand-to-mouth household. This thesis also finds that there is a difference in the change in consumption between poor-hand-to-mouth and wealthy-hand-to-mouth households when subjected to income shocks. These results need to be further tested due to sampling size limitations and the small proportion of poor-hand-to-mouth households in the population.

Finally, the thesis conducted a correlation study on the wealth effect of hand-to-mouth households, and the OLS results show that hand-to-mouth households do have higher consumption–income elasticities. The results also reveal that the wealth effects of liquid assets and illiquid assets are much smaller for hand-to-mouth households than for non-hand-to-mouth households. The wealth effects of housing assets are significantly higher for wealthy-hand-to-mouth households than for non-hand-to-mouth households.

5.2 Limitations and future research directions

This study is subject to some limitations. First, the study of the relationship between assets and consumption in this thesis is based on static asset and consumption data. While the liquidity of each asset class does not change significantly, their yields may change significantly, which may have an impact on the wealth effect of assets and household asset allocation.

Second, although the thesis demonstrates both the existence of a wealth effect on Chinese household assets and that household asset allocation has an impact on consumption, this thesis does not theoretically prove the existence of a link between the two. Also, because liquidity and returns vary across assets, the thesis cannot identify which asset characteristics have an effect on consumption or whether both have an effect.

Third, the thesis divides household assets into liquid assets, illiquid assets, and housing assets, but it is clear that this division is crude. Future research can divide assets more carefully, for example, dividing liquid assets into high-yield liquid assets (stocks) and low-yield liquid assets (cash and bank deposits), so that policymakers can formulate relevant policies more rationally.

Fourth, this thesis ignores the portion of household transfer expenditures to offspring when discussing consumption smoothing. Huang and Sun (2010) found that significant

intergenerational economic support in Chinese households by analyzing micro household data from Shanghai, China, and this should be considered in future studies. This thesis did not conduct a segmentation study of non-hand-to-mouth households. There may be different types of households in non-hand-to-mouth households, and there may be differences in the consumption behaviour of this segment of households.

Finally, the thesis did not consider the indebtedness of Chinese households in the empirical analysis due to data reasons. The indebtedness of Chinese households can be included in the independent variables in future studies.

5.3 Policy suggestions

There are several policy recommendations emerging from the findings of this thesis. First, the Chinese government should control housing prices. The results show that housing assets have a very weak wealth effect, but a rapid increase in house prices may affect both liquid and illiquid assets held by households. That is, a certain percentage of a down payment is required to purchase a house, and households may choose to reduce both liquid and illiquid assets because of the purchase of a house. The wealth effect of liquid and illiquid assets is much higher than that of housing assets, which in turn leads to a reduction in household consumption. Second, because of the specificity of housing assets, it is rare to increase consumption directly through the sale of housing. Still, it is feasible to make it easier for households to smooth consumption by mortgaging their homes through

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accelerated financial market development. Third, the Chinese government can increase illiquid assets and consumption by reducing the saving rate of households through policy attempts to reduce liquid assets. Fourth, since hand-to-mouth households have greater consumption–income elasticity, enough transfer payments or tax cuts implemented for hand-to-mouth households will generate more consumption. Finally, the effect on consumption of *hukou*, China's household registration system, is so pronounced that reform of the system is necessary for greater equality.

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