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**Financial inclusion towards economic inclusion: empirical evidence  
from China's rural households**

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A thesis  
submitted in partial fulfilment  
of the requirements for the Degree of  
Master of Commerce and Management  
at  
Lincoln University  
by  
Shan Jin

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Lincoln University

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Abstract of a thesis submitted in partial fulfilment of the requirements for the Degree of Master of Commerce and Management.

## **Abstract**

Financial inclusion towards economic inclusion: empirical evidence from China's rural households

by

Shan Jin

Financial inclusion, defined as the access to and use of formal financial services, has gained growing interest among regulators, governments and researchers. A wide range of literature revealed that financial inclusion is imperative for financial stability and economic growth. The concepts and measurements of financial inclusion vary among past studies and the level of financial inclusion is different across regions and economies. Only a few studies have focused on the level of financial inclusion in rural China where financial deprivation is most prevalent. Research on its associated determinants and pathways from inclusive finance to household welfare at the micro-level is scarce and lacks empirical support.

This study uses the probit model and ordinary least squares method with the China Household Finance Survey (CHFS) data carried out across 29 provinces in China to construct a comprehensive financial inclusion index to examine the extent of financial inclusion in rural China. We investigate the factors underpinning financial inclusion at the household level. The results demonstrate that the use of formal financial services is minimal among rural households and there is substantial inconsistency across regions. The eastern provinces exhibit the highest level of financial inclusion and the central region displayed the lowest level. Rural household characteristics such as family size, household head's education level, income level, employment status and financial literacy are significant determinants of financial inclusion whereas factors like household head's age, gender and communist party membership are insignificant.

The OLS results reveal that being financially included has a significant positive impact on household welfare measured by household annual consumption expenditure. For each financial service usage indicator, the use of a savings account, mobile payment account, credit card and commercial insurance raise household consumption expenditure by 7.8, 34.5, 29.2, and 22.4 percent, respectively. These provide an insight into the trajectory of economic inclusion that can emerge from an inclusive financial system at the household level.

**Keywords:** financial inclusion, determinants, rural household, household welfare, China

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# Chapter 1

## Introduction

### 1.1 Research Rationale

The concept of financial inclusion appears to be a surging topic among governments, financial sectors and academics in both developed and developing countries. The United Nations International Forum in 2005, as the International Year of Microcredit, emphasized the importance of financial inclusion as the primary enabler of poverty eradication and economic growth. The conference on Building Inclusive Financial Sectors for Development called for promotion of full and equal access to a wide range of financial services for all and addressing the policy and regulatory obstacles that prevent the formal financial sector from being inclusive (UNCDF, 2006). Financial inclusion, or access to credit, in particular, is considered a key contributing factor in achieving the United Nation's Sustainable Development Goals (SDGs) (Kara et al., 2021). Accordingly, G20 leaders have been committing to carry forward work globally on financial inclusion by embedding financial inclusion in the work of the global financial standard setters as the core development strategy for overcoming poverty, reducing inequality and stabilizing the world economy (GPFI, 2015; Soederberg, 2013).

Globally, many countries started to prioritize inclusive finance in their policy objectives, such as setting initiatives and integrating specific targets into relevant development policies. China has been promoting the concept of financial inclusion since the early 2000s. Financial inclusion was added explicitly to the agenda of achieving the goal of a moderately prosperous society. Over the past 15 years, China has achieved remarkable progress, including broadening the accessibility of basic financial services through expanding credit and payment services to rural customers, enhancing the physical outreach of service points to remote areas, and encouraging new types of financial service providers to enter the markets (World Bank Group & People's Bank of China, 2018).

However, there is still a critical gap between urban and rural populations regarding accessing and using financial services in China. Academic research is emerging, but most studies focus only at the country level. The determinants related to it and why financial exclusion is prevalent in rural China are not examined. Especially in the context of rural households, where financial illiteracy, inappropriate regulatory frameworks with weak contract enforcement mechanisms, and the disadvantaged characteristics of those households, these constraints can create bottlenecks in building an inclusive financial system.

Financial inclusion is a multifaceted concept that encompasses various indicators. The definition, measurement and metrics of financial inclusion are neither well-understood nor established in previous studies. The concept of financial inclusion needs to be fully integrated into long-term development goals in accordance with governments and regulators to achieve a sustainable growth of the economy. Failure to understand the meaning and determinants of financial inclusion will lead to policy implementation that lacks theoretical support. Hence, the identified research gaps, combined with theoretical background as an anchor, drive this study. This study endeavours to assess the actual level of financial inclusion of rural China through different lenses by considering traditional and modern financial products and services, as well as the key associated determinants. We also investigate the relationships between household welfare and financial inclusion efforts in the context of China's rural households. This study, therefore, enriches our understanding of the trajectory of financial inclusion towards inclusive economic growth in China.

## **1.2 Background to the Study**

Financial inclusion, defined as the process that ensures the access, availability, and usage of basic formal financial services (Allen et al., 2016; Chakravarty & Pal, 2013; Sarma, 2008) that are safe, appropriate, at reasonable cost to every member of an economy. These services are especially needed by the poor and other disadvantaged groups such as the disabled, women and unemployed. (Damodaran, 2013; Rangarajan Committee, 2008; Singh & Roy, 2015). The major manifestation of inclusive finance is the broad access and use of formal financial services, including savings accounts, borrowing and insurance. However, there is no consensus on the definition of financial inclusion.

A vast amount of empirical and theoretical evidence suggests that financial inclusion has substantial benefits in terms of the financial wellbeing of individuals, economic growth and social development. An inclusive financial system balances inequality in capital resource allocation instead of providing services in more advanced or profitable markets, which will reduce income inequality and the gap between the rich and poor (Allen et al., 2016; Turvey & Xiong, 2017). Ensuring ease of access to financial services enables the poor to accumulate savings and invest in health care, education, and income-generating activities, thereby improving social wellbeing and alleviating poverty (Hannig & Jansen, 2010; Honohan, 2008; Huang & Zhang, 2020). An inclusive financial system can limit the vulnerability of households by providing individuals with savings, credit and insurance tools, thus indirectly improving the stability and resilience of the financial system (Han & Melecky, 2013). Moreover, financial inclusion can address the issues of information asymmetry and high transaction costs, thereby improving financial efficiency and achieving sustainable, inclusive economic growth (Beck et al., 2007; Sarma, 2012). According to the latest data from the Global Findex Database 2017, despite the significant progress that has been made in promoting financial inclusion worldwide, there

are still 1.7 billion adults who remain unbanked. This phenomenon is most acute among low-income groups in developing economies, including China (Demirgüç-Kunt et al., 2018).

Development disparity is prominent in emerging countries, but ignoring rural areas may negatively affect social stability. The primary issue is that poor households are often constrained from formal financial systems for credit, savings and insurance services. They have to rely on informal financial services that may increase households' risk exposure to external shocks (Taylor, 2016). The World Bank Group (2013) stated that financial inclusion schemes to bring the poor under the scope of the financial system that is necessary to protect households against risks and to facilitate living opportunities.

Access to formal financial services is an indispensable part of rural households' daily activities, especially for those who participate in agricultural production. For instance, formal borrowing services enable producers to meet their cash needs caused by the characteristic agricultural production cycle, which usually takes considerable time lags in transferring product inputs into outputs (Conning & Udry, 2007). This characteristic makes credit services important for farmers to effectively manage their cash and address liquidity issues during production. Rural households are vulnerable to external shocks and adverse events such as diseases, extreme weather and disasters because of inadequate insurance mechanisms and limited stable savings. Without access to basic insurance services, farmers have to keep cash reserves to maintain future consumption and production. Other financial services such as depositing money, investing in businesses, transferring and receiving payments, and maintaining farming equipment are usually needed by rural households. Consequently, the availability and accessibility of financial services without discrimination allows farmers to meet their cash needs induced by agricultural production and to guard against risks, which will stimulate consumption and productivity thus improving the living standards of rural households (Dong et al., 2012).

### **1.3 Financial Inclusion in China**

The development of microfinance facilitated the availability and accessibility of financial services in China. Compared with other nations, China has a relatively high degree of financial inclusion in terms of account ownership, one of the major metrics of financial inclusion. According to the World Bank's Global Findex database 2017, the percentage of account ownership in China is 80%, which is higher than the world average of 69%. However, the use of formal credit remains minimal. The proportion of adults who are banked and borrow formally is only 23% in China. Moreover, there is significant regional disparity in access to and use of finance persists in China. Despite efforts to remove the geographical barriers preventing people from reaching financial institutions, the rural population

(e.g., farmers, low-income groups, women and unemployed) has been lagging, and much variation exists because of regulatory constraints (or barriers) and personal characteristics.

Previous studies in China have shown that access to and use of formal financial services have expanded mainly in urban areas; rural sectors are still underdeveloped. Rural areas typically have a lower population density with insufficient infrastructure. Soft information is critical in the rural banking system. Rural households' demand for financial products and services tends to be information-intensive for banks because they lack mortgage and creditworthiness information (Yeung et al., 2017). Furthermore, financial institutions face high transaction costs and operating expenditure in building infrastructure, screening and monitoring when entering rural areas (Lopez & Winkler, 2018). As a result, financial institutions are less able to make use of their economies of scale and productivity effects, which hinders the progress of financial inclusion in rural areas. In addition, farmers are the major component of rural households. Their credit demand for agricultural activities is characterized as being small and fragmented with high climate and seasonal risks that rarely occur in urban lending (Meyer, 2011; Moll, 2005). Because of the presence of asymmetric information and moral hazard problems in the credit market, formal institutions tend to lend money to borrowers with collateral and a guaranteed capacity to pledge against loans (Guo & Jia, 2009). Therefore, the trade-off between risk and return in lending rural households makes it unfavourable for financial institutions to serve in Chinese rural areas.

China has a large rural population, 39% of the total population in 2020 (World Bank Group, 2020). It is still transitioning from an agriculture dominated economy to an industrial economy. The financial system in China is mainly bank-oriented compared with other countries (Jung & Cha, 2021). The primary providers of rural financial services in China are Rural Credit Cooperatives (RCCs), the Agricultural Bank of China (ABC), and other institutions (e.g., Agricultural Development Bank of China (ADBC), microfinance institutions (MFI), Postal Savings Bank) (Dong et al., 2012; He & Li, 2005). However, the services provided are fundamental and confined to basic deposit-taking and short-term credit granting.

Since the reform and opening-up when rural communities spontaneously set up collective financial units, banks in rural China are key vehicles for delivering financial services to small-scale enterprises and farmers (Yeung et al., 2017). However, the banking system is still underdeveloped in rural areas, especially in impoverished regions (Feng et al., 2019). To promote access to financial services in rural and underserved areas, the government has implemented various policies to expand financial permeation. For example, the reforms initiated in 2006 aimed to promote the rural economy and reduce urban-rural income inequality. The approaches to ensure people's well-being and promote

social harmony and stability have facilitated banking penetration and sustainable bank lending to rural households and small and mid-size enterprises (SMEs) (Sparreboom & Duflos, 2012).

In addition, new rules were introduced, enabling new types of financial institutions such as village and township banks, rural mutual credit cooperatives, and other lending companies to enter into rural areas. Their existence can facilitate participation in formal financial sectors and rural development by providing financial services for agricultural production and improving access to formal banking. In addition, with new entrants expanding into rural areas and increased scale and scope of available funds for agricultural production, large incumbents have had to compete with them in terms of economic efficiency, thereby potentially empowering rural financial services (Turvey et al., 2011). According to Yeung, He, and Zhang's (2017) study, poor rural households can be geographically included in the formal financial system because of the enormous expansion of financial institutions. However, rural residents are still financially excluded because of a low level of financial literacy, lack of collateral and proper tracking records. The imbalance between the supply of and demand for financial services could encourage the proliferation of informal financial institutions in China.

China has achieved remarkable progress in expanding and deepening financial inclusion for historically excluded individuals and groups, including rural populations, SMEs, the poor and disadvantaged groups, and other social segments. The recent Plan for Advancing the Development of Financial Inclusion (2016-2020) emphasized an intense focus on improving availability, satisfaction, and coverage of financial services and products in China to allow each individual to share the benefits of financial services.

According to the China Inclusive Financial Indicators Analysis Report (2020) released by the Central Bank, primary financial service coverage in administrative villages has reached 97.13%. The proportion of active account ownership in rural areas reached 88.01%, having increased by 4.64 % from the previous year, and 82.72% of rural adults are reported to use digital payments. However, the use of other types of financial services lags in rural areas. For example, the proportions of rural household credit loans, commercial insurance, and financial investment products are 19.02%, 32.41%, and 33.03%, respectively. China was ranked by World Bank Group (2020) 80th of 100 countries worldwide in terms of the ease of getting a credit score of 60, indicating the use of credit remains a challenge in China's rural areas (Chen & Yuan, 2021).

#### **1.4 Research Problem Statement**

As discussed above, prior studies mainly focused on the overall level of financial inclusion in China, rather than regional disparity and households' perspective at the micro-level. There are still gaps in

both measurements of financial inclusion and in linking an inclusive financial system towards economic and social inclusion in China. The main objectives of this study are to bridge the gaps in the existing financial inclusion literature and contribute to both policymakers and academic researchers to enrich understanding of the extent of financial inclusion and why financial exclusion appears prevalent in rural China. In addition, the popularity of smart phone usage, the proliferation of branchless banking and mobile payment services in China provided convenient access to formal financial services. How and to what extent these changes can eradicate financial exclusion in China remains unclear.

Therefore, we constructed a comprehensive indicator to measure and investigate the degree of financial inclusion and have examined the key determinants of financial inclusion in rural China. This comprehensive index covers various components of financial inclusion, including both traditional measures and modern financial services and products. The study captures information from both demand and supply perspectives to present a holistic picture of financial inclusion in rural China. It also provides an insight into the pathways of welfare that can emerge from an inclusive financial system at the rural household level.

## **1.5 Research Questions**

The study's aim is to investigate and compare the level of financial inclusion in China from rural households' perspective at the micro-level and ascertain the relationship between household welfare and financial inclusion level in rural China. The research questions that guide this study are:

- (1) What is the level of financial inclusion of China's rural households?
- (2) What are the key determinants and constraints for rural households' financial exclusion in China?
- (3) How has technological deepening contributed to the drive towards an inclusive financial system in rural China?
- (4) What are the means through which financial inclusion translates into economic inclusion at the household level?

Based on the empirical results, this study will provide information for governments at all levels, policymakers and researchers by identifying factors that underpin financial inclusion across rural China and an understanding of the status quo of financial inclusion development. As a result, governments and policymakers can take appropriate, effective policy measures and actions to truly lift the living standards of the poor, unleash productivity and improve social welfare, thereby achieving sustainable economic growth and social development.

## **1.6 Organization of the Thesis**

The rest of the thesis is organized as follows. Chapter 2 discusses the literature on the level of and measures of financial inclusion in different economies and reviews the relevant literature on China to allow a deeper understanding of the status of financial inclusion in China. Chapter 3 details the empirical models for constructing our analysis. The research method and relevant data are clearly outlined for analysis, followed by Chapter 4, which discusses the empirical results of the level of financial inclusion, associated determinants and the impact of financial inclusion on household welfare. Chapter 5 discusses the study's findings and concludes with policy recommendations for academics and policymakers. The chapter ends with the study's limitations and suggestions for future academic research.

## **Chapter 2**

### **Literature Review**

This chapter provides an overview of the literature on financial inclusion and its relevant determinants. Chapter 2 is divided into four sections. Section 2.1 summarizes the definition and measurements of financial inclusion from previous research, which provides a theoretical basis for the thesis to further explore the analysis of financial inclusion. Section 2.2 introduces the concept of financial exclusion and its key determinants. Section 2.3 discusses the literature review in China, including the level of financial inclusion, main barriers to achieving an inclusive financial system in China. Section 2.4 summarizes the empirical studies on level of financial inclusion and its impact at micro-level. The last section, 2.5, summarizes the chapter.

#### **2.1 Measuring Financial Inclusion**

##### **2.1.1 The Definition and Importance of Financial Inclusion**

Financial inclusion, typically defined as the process that ensures the access to and use of formal financial services for every individual in the society, especially when needed by disadvantaged groups (e.g., the poor, low-income segments, and lagging sectors) (Allen et al., 2016; Sarma, 2008). Topics relating to financial inclusion have gaining interest and attention among governments, policymakers, and researchers worldwide.

The definition of financial inclusion varies among different studies. For instance, Hannig and Jansen (2010) demonstrate that the major task for financial inclusion is to get the unbanked population into the formal financial system. This will enable each individual in the society to have equal opportunity to make adequate use of basic financial services, from savings and payment transactions to credit and insurance services. Singh and Roy (2015) point out that financial inclusion aims to provide financial services to customers, who are excluded from the system, at an affordable cost and easy access. It is worth noting that financial services are provided not only by banks but also by other formal financial institutions that deliver a host of services from savings, credit, insurance, stocks and equity products.

Damodaran (2013) comes up with a broader concept of financial inclusion. The author states that an inclusive financial system does not simply mean ensuring the availability of a wide range of appropriate financial services by promoting bank account ownership but signifies the creation of understanding and awareness about financial products, namely, financial literacy. Hence, the definition of financial inclusion is not limited to opening a bank account or accessing credit. It

encompasses a wide range of services from access, usage, quality, barriers, and impacts of being financially included.

To date, there is a vast amount of studies on the benefits of financial inclusion, which is well-established worldwide. At the national level, there is growing evidence that having an inclusive economy can reduce information asymmetry and transaction costs, facilitating savings and credit, enhancing risk management, engendering a reduction in poverty and income inequality (Singh & Roy, 2015; Turegano & Herrero, 2018). Chattopadhyay (2011) indicates that an inclusive economy can improve financial stability and social welfare; a lack of inclusion in the financial system results in a loss of 1% to a country's GDP. Improving the financial inclusion level is considered a major strategy to achieve the United Nation's Sustainable Development Goals (Demirgüç-Kunt & Singer, 2017).

From an individual perspective, a well-function financial system allows inclusive access to appropriate financial services to meet a range of people's needs, including savings, payments, borrowing and risk management, which directly improve social welfare (Demirgüç-Kunt & Klapper, 2013). For instance, access to and use of basic formal financial services such as savings and borrowing may facilitate productive activities including education and entrepreneurship. Increased accessibility to microcredit could prompt entrepreneurship, especially for households with existing businesses. While lacking access to formal financial services, individuals, especially the disadvantaged groups, may rely on informal financial services (e.g., relatives, friends, pawnshop) to invest in their children's education or business activities, leading to further income inequality and hindering economic growth. Prior studies have shown that people with access to formal financial services are more likely to accumulate savings, increase productivity, promote investment in preventive healthcare and income-generating projects. These can improve living opportunities and reduce vulnerability to uninsured risks, which is vital to benefitting the poor and other vulnerable groups (Beck et al., 2007; Demirgüç-Kunt & Levine, 2009).

As discussed above, existing studies have been devoted to the definition and importance of financial inclusion. How to measure financial inclusion has become a major concern among researchers. It can be seen that a critical assessment of the definition and dimensions of financial inclusion accentuates the importance of inclusive finance for the social and economic development of an economy. However, because the concept of financial inclusion varies across studies, there is no consensus on the standard measurement criteria of financial inclusion. According to Sarma (2008), the measurement of financial inclusion is a multidimensional phenomenon. Failure to appropriately define or measure financial inclusion will lead to underestimating or overestimating the progress of financial inclusion and its associated impacts.

## **2.1.2 Types of Financial Inclusion Measurement**

The importance of financial inclusion is well established worldwide, though various studies have measured financial inclusion in different ways, which highlights how complex the definition of financial inclusion is. A single metric of financial inclusion is not comprehensive enough to represent the extent of financial inclusion or understand changes over time. Instead, various components need to be involved with considerable magnitude. Prior studies on measurements of financial inclusion levels can be divided into three aspects: from demand, supply aspects of financial inclusion, or both.

### **Supply-side financial inclusion**

Sarma (2008) proposes an index of financial inclusion (IFI) through a multidimensional approach from three aspects to measure the level of financial inclusion across economies at a particular time. This IFI has been widely used in different studies to answer empirical questions on the relationships between various factors and the development of financial inclusion and to monitor the progress of achieving inclusion in the financial system of an economy. The measurement of financial inclusion is categorized into three dimensions: banking penetration, availability, and use of banking services.

Banking penetration aims to measure the size of the banked population (i.e., the number of people having a bank account) because account ownership serves as a gateway to access various types of financial services. This metric is measured by the proportion of the total bank account numbers to the total population. Regarding the availability of banking services, it indicates how easily banking services can be accessed by customers or is regarded as bank density, which is measured by the number of bank branches and/or ATMs per 1,000 population, or the number of bank employees per customer (Sarma, 2008; Sarma & Pais, 2011). Some studies have measured the availability of banking services in terms of the landmass, including the number of bank branches and/or ATMs per 1,000 km<sup>2</sup> (Chakravarty & Pal, 2013; Arora, 2017). The final metric of financial inclusion is the usage of banking services. This dimension is motivated by the presence of underbanked people, observed by Kempson et al. (1999), i.e., merely having a bank account is not enough to be considered an inclusive financial system. Instead, banking services should be adequately and frequently used. Typical indicators include basic financial services such as payments, savings, and borrowing, proxied by the volume of loans and deposits as a proportion of the country's GDP (Sarma, 2008; Wang & Guan, 2017), or the number of bank borrowers and depositors per 1,000 adults (Park & Mercado, 2015).

### **Demand-side financial inclusion**

Several studies attempted to measure financial inclusion by relying on demand-side data that focus on indicators including formal account ownership, use of formal savings, and use of formal credit (see for example, Demirgüç-Kunt & Klapper, 2013; Fungáčová & Weill, 2015). Specifically, Demirgüç-Kunt and Klapper (2013) define financial inclusion as the use of formal financial services; therefore, it

is important to distinguish actual use from access to financial services to reflect the factors affecting people who are not participating in the formal financial market. The first indicator considers account ownership and use of bank accounts at formal financial institutions, measured by the percentage of adults who have individual or joint ownership of a formal bank account. The second parameter reveals individuals' saving behaviour, including those who have saved or set aside money in general during the past 12 months. The last indicator of the use of formal credit collects information on the purpose and source of borrowing and use of credit cards. All these metrics help researchers to investigate the mechanics of purpose and frequency of use of finance, and the barriers to financial inclusion from the demand side.

### **Demand and Supply Side Financial Inclusion**

On the theoretical basis of Sarma's (2008) IFI, few studies have constructed a more comprehensive measure of the degree of financial inclusion that captures both demand and supply information. For instance, Cámara and Tuesta (2014) postulate that the extent of financial inclusion is determined by access, usage, and barriers to financial inclusion. The authors indicate that supply-side information (accessibility and usage of finance) is necessary, whereas demand-side data indicate the reasons why people fail to be financially included is an indispensable part of analysing the inclusiveness of the financial system. The barrier dimension covers four variables: distance, affordability, documentation, and lack of trust, which produces information about individuals' perceptions of using formal financial services. In addition, the authors used a parametric method to investigate the level of financial inclusion in 82 countries by using a two-stage Principal Component Analysis to assign weights for each dimension.

Accordingly, Amidžić et al. (2014) develop a composite index to address the issue of substitutability and proper weight assignment between dimensions. The authors recognize outreach, usage, and quality of financial services as three major dimensions using factor analysis. The dimension of quality focuses on customers' experiences to gauge the relationship between customers and financial service providers and understanding customers' perceptions, knowledge, and choices of different financial services. However, because the data are scarce on the quality dimension, the authors did not consider the quality dimension in the computation of the proposed index. These methods address the issue of previous studies that assign equal weights to each indicator or assign the importance (weights) of indicators subjectively based on the author's intuition. This is because a slight change in the importance of indicators might alter the results dramatically (Lockwood, 2001).

However, some cases lack a theoretical framework in the selection of dimensions and components of financial inclusion. Past attempts on composite indicators are incomplete because of a lack of relevant data on certain aspects of financial inclusion and are constrained by subjective methodology

problems. Overall, the mismatch between the definition and measurement of financial inclusion in practice leads to biased results on the level of financial inclusion (Pesqué-Cela et al., 2021).

## **2.2 Financial Exclusion and its Determinants**

### **2.2.1 Defining Financial Exclusion**

The majority of the financial inclusion literature has focused on reasons for not using formal financial services (known as financial exclusion). Financial exclusion, the opposite of financial inclusion, is derived from a broader concept of economic exclusion, which means depriving people of access to credit and income to transfer to build capital assets, thereby restricting their living opportunities in the economy (Singh & Roy, 2015). Sinclair (2001) defines financial exclusion from two perspectives: a narrow sense and a wider sense. The narrow sense means exclusion from particular financial services such insurance, appropriate deposit account or source of credit. The broader sense refers to excluding less fortunate or privileged groups from mainstream financial services.

Simply, financial exclusion is a process that prevents the poor and vulnerable groups from accessing suitable, affordable and safe financial products and services from mainstream financial providers (Damodaran, 2013). Financial exclusion can occur for many reasons, ranging from low outreach of banks to inconvenient and unaffordable products, lack of income and financial literacy or customer awareness of high transaction costs (Beck & Demirgüç-Kunt, 2008).

Kempson and Whyley (1999) discover five dimensions of financial exclusion: access exclusion, condition exclusion, price exclusion, marketing exclusion, and self-exclusion. The authors point out that the key to combating financial exclusion is to understand whether individuals are excluded because of a lack of access to financial products or services or whether they self-exclude. They recognize the term financial exclusion comprises a variety of circumstances and characteristics; these include people rejected by the financial services industry, those who choose not to use any, and who self-exclude because current products are inappropriate or unaffordable. Nandru et al. (2016) encapsulate the causes of financial exclusion that comprise: self-exclusion; the price of financial products exclusion because of unaffordable financial products; conditional exclusion, which implies a population deterred by conditions attached to financial products that are inappropriate or less useful; marketing of financial products, which includes individuals with no financial products who are less approached by sales; and the psychological barrier because some people believe financial services are not needed.

In the same vein, the World Bank Group (2013) differentiates nonusers of financial services into voluntary and involuntary exclusion (see Figure 2.1). Voluntary exclusion comprises people who do

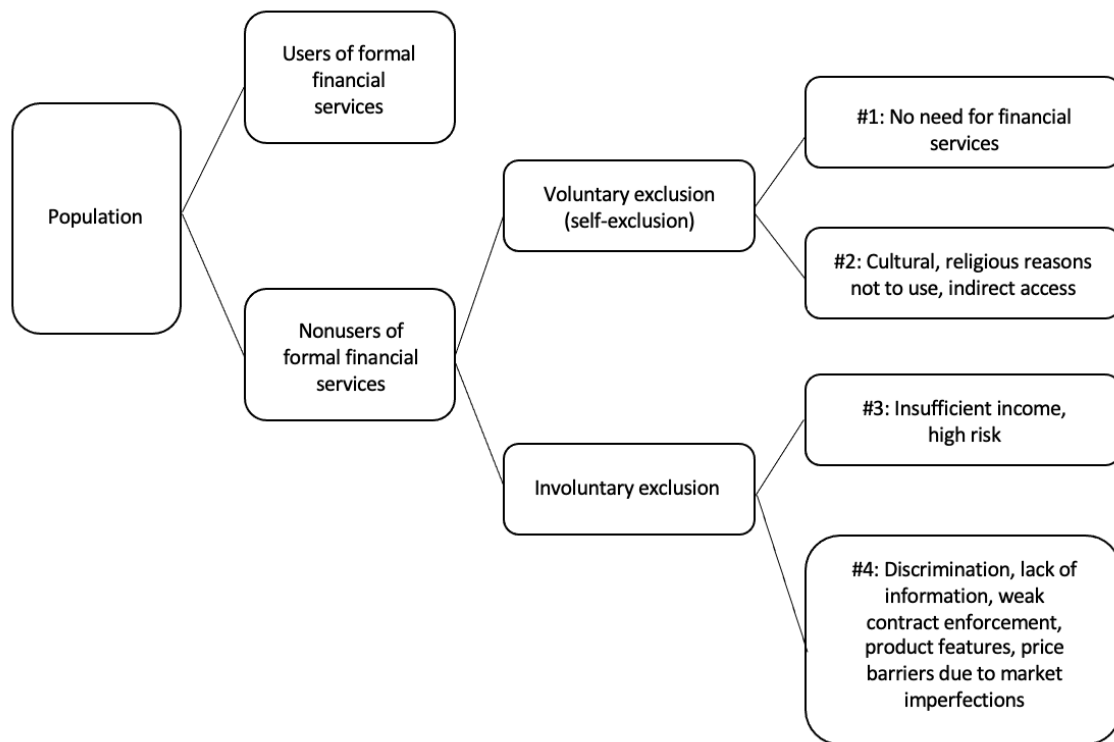


Figure 2.1 Financial Exclusion Groups in the Population

Source: World Bank Group (2013)

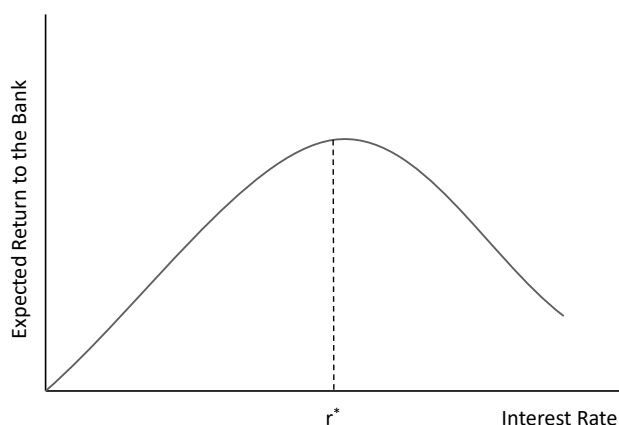
not need financial services or, for cultural and religious concerns, do not use them. Amidžić (2014) demonstrates that this part of the segment population is not directly caused by market failure, but instead by a lack of customer demand, financial literacy and awareness of financial services. The major ways to address this issue are to improve financial literacy, encourage financial education and adjust financial products/services that meet cultural or religious requirements. On the other hand, involuntary exclusion consists of individuals or firms due to lack of income or considered to be a high-risk profile. While the other groups of people who are involuntarily excluded may be caused by market failure or market imperfection, since those people are constrained to access to formal financial services such as discrimination, inappropriate products, price, and regulatory barriers.

It is noteworthy that people who have access but decide not to use reflects a lack of demand; thus, it is vital to distinguish between access and the actual use of financial services because of the presence of voluntary exclusion. One major task is to address the issue of 'inactive users'; these are the people who open formal accounts but refuse to keep deposits, initiate payment transactions or access credit services from their own formal accounts; that financial inactivity will create a new problem for policymakers. Therefore, to accomplish the target of building an inclusive financial system is to maximize the use of and access to financial services and minimize involuntary financial exclusion (Ozili, 2020).

According to the World Bank Group (2013), the main objective of financial inclusion, in principle, is to minimize involuntary exclusion (see category #4 in Figure 2.1). In developing countries, formal financial institutions are reluctant to expand and lend to individuals or small and medium enterprises in underdeveloped areas because of a lack of information, high customer risk profile and discrimination. However, it is worth noting that financial exclusion may also arise in competitive markets because the credit market is characterized by severe principal-agent problems such as moral hazard and adverse selection (Stiglitz & Weiss, 1981).

The moral hazard is that customers may change repayment incentives and invest in higher risk activities to cover their borrowing costs, which will lead to increased default risk. Though adverse selection indicates high interest rates will attract risky customers, this is because customers deemed to be low risk are likely to have received some form of credit (Miller, 2013). Financial institutions face difficulties in differentiating between safe and risky customers because of imperfect information. As a result, individuals or firms may face credit rationing problems and still be excluded in the financial market in advanced economies, even if the credit market is in equilibrium.

As shown in Figure 2.2, the relationship between expected return to the bank and interest rate is a concave function. The expected rate of return of a loan will decrease beyond the optimal interest rate  $r^*$  (Stiglitz & Weiss, 1981). Because it will not be profitable to supply more credit, financial institutions might deny part of loan applications that even offer a higher interest rate  $r^M$ . Therefore, the constrained access to credit leads to financial exclusion from the market.



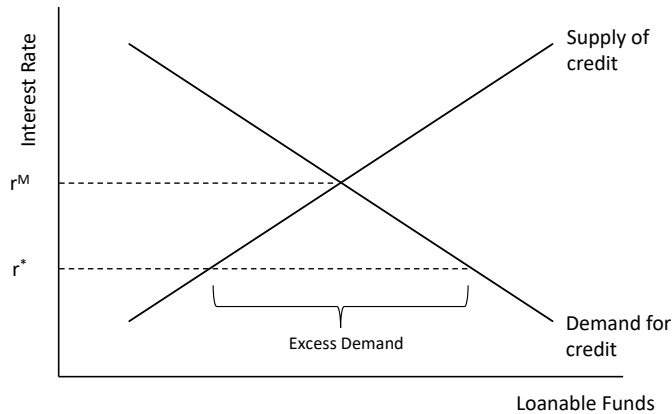


Figure 2.2 Credit Rationing and Financial Exclusion in Market Equilibrium  
 Source: Adapted from Miller (2013) and Stiglitz and Weiss (1981)

### 2.2.2 The Determinants of Financial Exclusion

There is no consensus on the determinants of financial exclusion or barriers to financial inclusion based on the literature. The factors associated with financial inclusion are numerous, and the interaction between each element is complex. We summarize the factors that relate to financial exclusion are as follows.

#### Distance

In general, geographical remoteness diminishes the probability of people to access to formal finance, and the low-income segment is more likely to perceive distance as a barrier to accessing financial services. According to Ali et al. (2020), location is considered to be the key barrier to obtaining financial services from and being able to accumulate savings in Islamic banks in Indonesia. Similarly, Allen et al. (2016) reveal that access to financial services, measured by branch and ATM geographic penetration, is significantly related to account ownership and using formal accounts to save. Gupte et al. (2012) conclude that geographic penetration of bank branches and ATMs is crucial in improving financial inclusion in the Indian context.

#### Income

Past studies identified that financial exclusion is a part of social exclusion; choosing to be financially excluded is highly related to individuals' economic circumstances. Kempson and Whyley (1999) point out that income level significantly influences the chance of exclusion. The likelihood of being a non-user of finance products or services increases as the income falls. Several studies demonstrate that income level and financial inclusion are positively related, such as Cámara and Tuesta (2014), Demirgüç-Kunt and Klapper and Kumar (2013). Sarma and Pais (2011) examine social-economic factors related to financial inclusion. The results show that income level proxied by GDP per capita is positive and highly significant to financial inclusion, which implies the fact that the higher the income

level, the higher the degree of financial inclusion. In the same vein, Datta and Singh (2019) state that per capita GNI has a positive relation to financial inclusion. As per capita GNI rises, the flow of financial resources tends to increase, which is generally handled through the use of enhanced banking service. Fungáčová and Weill (2015) claim that income is the major explanation for not having an account. Opening a financial account serves as a vital prerequisite to getting involved in the financial system. The study results show that income has a positive and significant impact on account ownership.

### **Age**

Based on the study by Sanderson et al. (2018), there is a positive relationship between age and financial inclusion. The research results are supported by the negative coefficient of the age squared, which is consistent with the findings of other research (see for example, Chen & Jin, 2017; Fungáčová & Weill (2015)), because people tend to become more knowledgeable and interested about the various financial products when they reach a certain age. This phenomenon can be explained by Modigliani's life cycle theory; people tend to accumulate savings over the course of a lifetime and dis-save in old age (Modigliani, 1986).

### **Lack of Documentation**

According to Sanderson et al. (2018), banks tend to undertake customer due diligence in light of government regulations. At the same time, customers are bothered by the cumbersome documentation and procedures. Some low-income groups often lack a track record (e.g., proof of residence, income, employment status) to allay lenders' concerns. This means individuals who don't have the required documents are involuntarily excluded from the financial sector. On the other hand, Fungáčová and Weill (2015) find limited evidence for the lack of documentation factor. People from relatively low-income quartiles have a significant negative relationship between account ownership and lack of documentation, whereas individuals from middle-income levels are less sensitive to documentation requirements. Similarly, Allen et al. (2016) do not find a significant relationship in their sample with documentation requirements.

### **Gender**

The World Bank Group database highlights the gender gap in account ownership and the use of savings and borrowings worldwide (Demirgüç-Kunt et al., 2018). In brief, gender exerts an influence on financial inclusion in terms of having formal accounts and borrowing from formal institutions. According to the study on China by Fungáčová and Weill (2015), women are less likely to report having a formal account or accessing to formal credit, especially when other family members have an account. This reflects that men are regarded as having the prominent role in the financial behaviour for China's households. Interestingly, Ouma et al. (2017) indicate that the gender variable has a significant positive impact on saving behaviour in Africa, implying that women are more likely to save

than men, but the amount saved by men is greater than by women. This can be explained by men being likely to be better paid or have easier access to family assets, which allows them to save more. However, a few studies [e.g., Tuesta et al., (2015) in Argentina; Akileng et al. (2018) in Uganda] find inconsistent results, i.e., there is no difference by gender in terms of account ownership, whether in credit or debit card ownership.

### **Education**

With regard to the education factor, Peña et al. (2014) explore the factors determining financial inclusion in Mexico from the demand side using non-linear regression analysis. The authors' results reveal that education has a significant positive impact on financial inclusion because better education allows individuals to better use knowledge, skills and capacity to participate in formal financial markets. Datta and Singh (2019) also find a positive, significant coefficient associated with education (measured by school enrolment rate) and financial inclusion level, which implies that a higher education level will lead to greater inclination to and recognition of financial services, resulting in an enhanced financial inclusion index. Fungáčová and Weill (2015) reveal that education could influence the level of financial inclusion in different aspects in China. Specifically, education level is positively associated with formal account ownership and tertiary education is positive and significant when considering formal credit. Nevertheless, the authors find no effect of education level in the use of formal saving. On the contrary, Akileng et al.'s (2018) findings indicate that education and financial inclusion in Uganda are not significantly related. The authors believe that education differs from financial literacy since not all educated individuals are financially literate.

### **Financial Literacy**

A cross-country study by Grohmann et al. (2018) analyse the relationship between financial literacy and financial inclusion measured by four factors: having a bank account, having a debit card, saving at formal financial institutions, and using a debit card. The research results show that higher financial literacy has an apparent beneficial effect on financial inclusion across different income levels and subgroups within economies. Several studies state that financial literacy has a positive, significant impact on financial inclusion; better financial literacy or awareness of financial products indicates higher demand for formal finance by the populace, because financial literacy enables individuals to improve decision-making on financial issues (Lusardi & Mitchell, 2011). However, Ozili (2020) claims differently; the author identified that financial literacy alone cannot promote financial inclusion unless a lack of financial knowledge is the main and only cause of not using financial services. This is because merely having knowledge of how to use financial services cannot eliminate structural barriers that prevent individuals from accessing finance.

## Digital Technology

A number of studies show that the prevailing internet and mobile phone usage allows financial service providers to collect and accumulate digital information of customers who, in turn, better understand, target, and reach previously excluded segments. The emergence of financial innovation, concretely, the adoption of financial technology, allows customers a high level of convenience, immediacy, and security through digitalized online transactions that are easier to screen and monitor [see for example, Agarwal et al. (2020), Chen & Yuan (2021), Demirgüç-Kunt & Klapper (2013)].

Andrianaivo and Kpodar (2011) demonstrate that Information and Communications Technology (ICT) development captured by mobile phone penetration is conducive to economic growth in Africa and the interaction between penetration rates of mobile and financial inclusion is positive and significant. In addition, a recent study by Ouma et al. (2017) seek to establish the linkage between the pervasive use of mobile and the formal financial services. The findings show that the availability and usage of mobile phones foster the likelihood of saving and the savings amount at the household level. This is because mobile financial services' deepening has become an instrumental tool to integrate the hitherto financially excluded segments by reducing transaction costs and geographical barriers.

A study by Shen et al. (2018) reveal that digital financial product usage has a significant positive relationship with financial inclusion. However, the relationship between internet usage and financial inclusion is insignificant. The use of the internet acts as a catalyst to digital financial product usage, which indirectly affects financial inclusion. Demirgüç-Kunt et al. (2018) state that high mobile phone ownership and internet converge could overcome the barriers that prevent unbanked people from accessing financial services, whereas digital technology alone is not enough to improve financial inclusion and robust consumer protection. Table 2.1 summarizes the factors that affect the financial inclusion level discussed above.

Table 2.1 A Summary of the Factors that Affect the Financial Inclusion Level

Factor	Author(s)	Relationship with financial inclusion
Distance	Ali et al. (2020), Allen et al. (2016), Gupte et al. (2012)	Negative
Income	Kempson & Whyley (1999), Cámara & Tuesta (2014), Kumar (2013), Demirgüç-Kunt & Klapper (2013), Sarma & Pais (2011), Datta & Singh (2019), Fungáčová & Weill (2015)	Positive
Age	Sanderson et al. (2018), Chen & Jin, (2017), Fungáčová & Weill (2015)	Positive
Lack of documents	Sanderson et al. (2018), Fungáčová & Weill (2015), Allen et al. (2016)	Mixed
Gender	Fungáčová & Weill (2015), Ouma et al. (2017), Tuesta et al. (2015), Akileng et al. (2018)	Mixed
Education	Peña et al. (2014), Datta & Singh (2019), Fungáčová & Weill (2015), Akileng et al. (2018)	Mixed
Financial literacy	Grohmann et al. (2018), Lusardi & Mitchell (2011)	Positive
Digital technology	Agarwal et al. (2020), Chen & Yuan (2021), Demirgüç-Kunt & Klapper (2013), Andrianaivo & Kpodar (2011), Ouma et al. (2017), Shen et al. (2018)	Positive

In general, the determinants attributed to financial inclusion or exclusion vary in different economies and regions; factors that affect one country might be insignificant in another country. In addition, empirical research on the determinants of not using financial services or financial exclusion is relatively new. Most studies are constrained by no access to bank accounts whereas ignoring the actual use of financial services is a crucial indicator of a country's financial depth. Existing research has failed to consider whether financial exclusion is more prevalent among certain groups, such as the poor, low-income groups, and rural populations that usually have less access to finance than urban communities (Altunbas et al., 2010; Demirgüç-Kunt et al., 2018).

## **2.3 A Review of Relevant Literature on China**

### **2.3.1 Financial Inclusion in China**

Most literature related to China mainly focuses on two parts: the extent of financial inclusion and the determinants of or barriers to financial inclusion in China. In terms of the level of financial inclusion, Fungáčová and Weill (2015) compare the degree of financial inclusion in China from the demand side of financial inclusion, including the usage of formal accounts, formal savings and formal credit. They find that China has a high level of financial inclusion compared with other BRICS (Brazil, Russia, India, China and South Africa) countries in terms of greater use of formal accounts and formal savings. However, the use of formal credit in China is far less frequent than in the other BRICS countries; the limited use of credit could create long-term potential challenges for future economic growth.

Using data from the China Household Financial Studies (CHFS) in 2011, Chen and Jin (2017) examine financial inclusion in China in terms of credit use and find that over half (53.21%) of the sample used credit, but only 19.77% used formal credit. The findings indicate that Chinese households had a relatively low prevalence of using formal credit. In addition, regional disparity in the use of credit was significant; western residents were more likely to use informal credit than the residents in eastern regions, whereas residents who live in the middle were less likely to use formal credit than western residents. Similarly, Chen, Feng and Wang (2018) construct a financial inclusion index using a panel data model with data from 31 provinces in China from 2005 to 2016. Considering the availability, usability, utility, and affordability of financial services, the authors point out that eastern regions have a high level of financial inclusion whereas western areas have a relatively low level. Hence, it is worth noting that the level of national financial inclusion cannot be considered as being consistent with the local level.

Technological innovation plays a vital role in improving financial inclusion efforts. There is an emerging topic on the relationship between digital technology and the level of financial inclusion in China. The World Bank Group (2018) investigates financial inclusion with the financial technology

revolution and reveal that the use of digital financial services such as mobile money services, online banking and other financial technology, could benefit from financial inclusion (Demirgüç-Kunt et al., 2018). In China, its comprehensive identification system, advanced mobile telephone infrastructure and wide internet penetration have created opportunities to improve financial access at low cost through “branchless banking” (Sparreboom & Duflos, 2012). According to the Global Findex Database 2017, mobile payments through technology platforms have accelerated the use of accounts in emerging economies; 57% of account users in China make purchases or use digital payments from the internet (Demirgüç-Kunt et al., 2018). The popularity of e-commerce and mobile phone payments, great expansion in high-quality internet coverage, and extensive use of smartphones in China that exploited the large scale of mobile transactions has expanded the channels to access the financial services (Chen & Yuan, 2021). However, Turvey and Xiong (2017) analyse financial inclusion and e-commerce in rural China to find that even though China has been relying on communication technologies (e.g., e-commerce, mobile payments, online banking), internet technology adopted by households and farmers in rural areas accounts for only half of all users, with less than 2% having accessed credit from the internet.

The second literature strand on financial inclusion has focused on the determinants of or obstacles to financial inclusion in China. A large number of empirical studies conclude that branch density, inconvenience, sophisticated documentation and procedures are major causes of limited access to formal financial services (Damodaran, 2013). According to Fungáčová and Weill (2015), the use of the financial services is highly correlated with socio-economic factors and individual characteristics. Higher income and education, male and older age are closely related to greater use of formal accounts and credit in China. However, the authors find that income and education are not significant; better education does not contribute to better access to credit in China but affects the adoption of alternative credit sources. The results show that the major motives for not using formal services are ‘lack of money’, ‘family member having an account’ and ‘too far away’. Other common reasons such as ‘lack of documentation’, ‘too expensive’ and ‘less trust in banks’ are less frequently cited in China compared with other BRICS countries. Based on that, financial exclusion is limited in China and the major obstacles of not using formal financial services are attributed to voluntary exclusion.

Accordingly, the limited access to credit is because of the inadequate bank credit supply and households having relatively low levels of financial literacy. Formal credit was allocated disproportionately to groups with advantaged social and economic resources. Therefore, access to formal credit was constrained to a level of family income and financial assets that can be used as collateral, resulting in most Chinese households relying on informal credit (Chen & Jin, 2017). Ozili (2020) indicates that financial inclusion is influenced by factors such as the level of poverty and

financial innovation, the macroeconomic environment, financial stability and financial literacy. However, the author points out that having knowledge of the importance and how to use financial services cannot eliminate the substantial hurdles that deter access to finance, unless a lack of literacy is the only barrier to using financial services.

### **2.3.2 Financial Exclusion of Rural Households in China**

Zhang (2013) reveals that financial exclusion is a serious social problem that is prevalent in China's rural areas. The reasons for Chinese rural financial exclusion include few financial institutions, severe financing conditions, high costs and a serious gap in financial marketing. The author indicates that financial exclusion is the manifestation of market failure because of the uneven distribution of social resources. China is one of the fast-growing developing countries with large rural populations. Financial exclusion will affect the sustainability of social development, causing massive economic losses. Zhu, Zhou and Zhao (2021) measure the level of financial exclusion of households in China by analysing whether the households have formal financial accounts and then dividing financial exclusion into asset financial exclusion and liability financial exclusion. Their findings reveal that social relations have a significant negative impact on household financial exclusion.

The importance of access to and use of finance is well-established in the literature. In particular, access to credit, which acts as a catalyst for economic growth, allows the poor to generate income and access to other financial and social resources such as education, insurance and health care, thereby improving income equality and individual wellbeing (Claessens, 2006). Chinese rural credit markets can be categorized into two sectors: the formal and informal markets (Dong et al., 2012). Formal credit refers to credit services provided by formal financial institutions within the policy framework of the financial system and regulated by the government (Campero & Kaiser, 2013). Past surveys have found that over half of rural households with debt used informal credit (He & Li, 2005; Turvey & Kong, 2010). Some village people even prefer informal credit instead of formal credit because informal credit is more convenient with flexible borrowing terms and fewer restrictions on how the loans should be used. Informal credit can be less costly than formal credit because people who borrow from friends or relatives normally pay zero or low interest (Tang & Guo, 2017; Turvey & Kong, 2010). Therefore, to understand the major determinants that cause the difference between access to and use of finance, a comprehensive review from both demand and supply perspectives must be taken into consideration.

Turvey and Xiong (2017) reveal that policies related to financial inclusion might cause some lenders to be wary about expanding into rural areas because of the high risk of non-performing loans. Provinces with higher Engel coefficients are less likely to have a high score for financial inclusion, indicating that financial institutions are reluctant to expand into economically backward and remote

areas. In addition, Chen and Jin (2017) accentuate that financial inclusion presented by the use of formal credit, is highly inaccessible to certain groups of people. Individuals' socio-economic conditions, such as a steady income stream, education level, employment status and asset ownership, are common criteria needed by banks when people apply for formal credit. These requirements are difficult to meet, especially for low-income groups living in rural areas. Even if people meet the conditions, large financial institutions are still reluctant to lend because the trade-off between return and risk is too small to be profitable (Beck et al., 2008).

Hu et al. (2021) explore the relationship between financial inclusion and agricultural productivity in rural China using provincial-level data from 2009 to 2018. The authors use the entropy method to construct a composite financial inclusion index. The results reveal that the eastern provinces have the highest financial inclusion scores and the central regions have the lowest. Among the 30 provinces in the study, Beijing and Shanghai are at the leaders. The panel data regression model's results show that financial inclusion significantly promotes agricultural productivity growth in rural China, with the usage dimension having the most significant impact.

To date, most prior studies have analysed the level of financial inclusion in China from the supply side (Chen & Yuan, 2021; Huang & Zhang, 2020) of financial services, only a few studies reflect information from the demand side (Chen & Jin, 2017; Fungáčová & Weill, 2015). These studies cannot offer a comprehensive picture of financial inclusion levels in China because of limited sample size and data, complicated measurement assumptions, and other unobservable indicators used to identify the financially excluded population (Ozili, 2020). For example, since 2011, the World Bank Group has constructed over 200 indicators to provide an overview of financial inclusion based on the data collected from individuals worldwide. The World Bank Group compilation used nationally representative surveys of over 150,000 adults in over 140 economies, including China. The most recent 2017 Global Findex database covered both urban and rural citizens from 29 provinces or regions in China. However, the performance of the financial system significantly varies across different dimensions and the database is limited and cannot reflect levels of financial inclusion across different regions in China.

Furthermore, customer perception and behaviours towards financial services keep changing with the social environment and over time; an updated investigation is needed to gain a better insight into the level of financial inclusion. Current studies are mainly conducted in urban areas, thus further empirical research is needed that focusses on rural areas to provide a more systematic understanding of financial inclusion. The most recent study from Word Bank Group in 2017 demonstrates that around 200 million of the rural population remain outside the formal financial system in China. Therefore, it is essential to explore the financial exclusion issue in rural areas where

poverty is most pronounced. China, with a large population, is sensitive to conclusions obtained from the limited sample that cannot be representative of the country. Another outstanding drawback of existing measurements of financial inclusion is that previous indicators are restricted to traditional financial products and services, which ignores the deepening of modern financial technology such as internet banking, online payments, and mobile money services. For the determinants of financial exclusion, existing research mainly focusses on the determinants of account ownership as a measure of financial inclusion. Factors that determine the use of various financial services or products remain embryonic. Only a few studies in China have focused on financial inclusion from the household perspective at the micro-level. Thus, a more diversified, detailed sample that exploits the uniqueness of individual-level data is needed to investigate financial inclusion in rural China.

## **2.4 The Impact of Financial Inclusion on Household Welfare**

The benefit of an inclusive financial system for improving the living standards of the poor, low-income, and other disadvantaged groups is well documented in past studies. For instance, individuals with access to various financial services have better opportunities to invest in education, health care and businesses, as well as manage financial risks and absorb external shocks. Most studies focus on macroeconomic factors, such as financial inclusion acts as a catalyst to greater economic empowerment, poverty alleviation and income inequality reduction (Bruhn & Love, 2014; Claessens, 2006; Demirgüç-Kunt et al., 2018; Turegano & Herrero, 2018). These studies have intensified the debate on financial inclusion as an essential conduit for achieving sustainable development and inclusive economic growth. However, in spite of the tremendous attention paid to the crucial role of inclusive finance, research on how economic inclusion can emerge out of financial inclusion at the individual or household level is scant. Understanding the linkage between financial inclusion with micro-level evidence in the context of local households is necessary to design effective government interventions and policies to achieve an inclusive financial system.

To date, there is little systematic research on how individuals experience the impact of financial inclusion at the micro-level. For instance, a study by Bruhn and Love (2014) concludes that increased access to finance has a sizable positive impact on low-income individuals' economic activity and income level. The channels are through the labour market, namely, by fostering the creation of informal business operations and improving employment. DeLoach and Smith-Lin (2018) investigate the relationship between access to formal banking services and the ability to absorb adult health shocks in Indonesia. The findings reveal that households with access to formal savings and credit enables them to draw upon savings and borrowings from banks in response to idiosyncratic household shocks. In contrast, households without access to banking services end up liquidating productive assets. Célerier and Matray (2019) examine the impact of financial inclusion on low-

income individuals' wealth accumulation in the context of U.S. banking deregulation from 1994 to 2005. The authors conclude that financial inclusion fosters household wealth accumulation in liquid and durable assets. The results suggest that promoting financial inclusion for low-income groups leads to better smoothing consumption, access to debt and financial security.

Mallick and Zhang (2019) analyse the effect of financial inclusion on consumption inequality at the household level in China. The findings reveal an uneven impact of financial inclusion on alleviating consumption inequality. The effect of welfare improvement varied among income groups and was limited in urban households. There was no effect on consumption inequality in rural areas in China. Zhang and Posso (2019) construct an index of financial inclusion using CHFS 2011 data from access to formal financial services, including payment transactions, savings, credit and insurance services. The study's findings elicit that financial inclusion positively impacts household income in China, especially for low-income households. Churchill and Marisetty (2020) examine the effects of financial inclusion on household poverty covering 45,000 Indian households. The results show that financial inclusion has a significant poverty alleviation effect measured three ways (household Poverty Probability Index, household deprivation score and the poverty line). Iddrisu and Danquah (2021) analyse the household welfare impact of financial inclusion in Ghana from both consumption and income-based approaches. The authors detail that financially deprived households have lower welfare than their financially included counterparts.

Overall, the literature suggests that inclusive finance can promote household wealth accumulation in several ways. First, it ensures household access to formal saving services can facilitate savings mobilization, which allows households to set aside present consumption for future rewards (Ashraf et al., 2006; Célerier & Matray, 2019). Second, promoting income transferring into savings enables households to earn compound interest and improve their ability to make investments and accumulate liquid and durable assets. Third, financial inclusion can enhance the ease of getting credit, thereby fostering credit penetration, which allows hitherto excluded households to participate in the credit market, smooth their consumption, invest in durable assets and income-generating activities (Iddrisu & Danquah, 2021). Last but not least, providing individuals with insurance services can facilitate households' resilience to absorb idiosyncratic shocks. This can be met by purchasing health, life and property insurance that enables households to better confront unexpected events, thus reducing the vulnerability of households, especially low-income and rural farmers households (Célerier & Matray, 2019).

However, most studies above measured financial inclusion merely on one subset of financial inclusion, bank account ownership, to investigate the causal impact of financial inclusion on individuals. Financial inclusion at the household level should be characterized by households using

formal financial services, the omission of the other components could lead to misleading results. Prior studies focus on the benefits of financial inclusion at the macro-level and the transmission mechanism of the ways through which financial inclusion could improve household welfare remains unsolved. Therefore, this study contributes to the literature by shedding light on whether and how financial inclusion can truly lift households' living standards and enrich understanding of the channels of financial inclusion that can facilitate achieving inclusive economic growth at the household level in China.

## **2.5 Chapter Summary**

This chapter reviews the literature on the definition, measurement of and factors impacting financial inclusion to serve as a conceptual basis for this study. An inclusive financial system can facilitate a more conducive environment for economic growth and social development, which is well-established in prior research. However, the concept of financial inclusion and the factors related to it are mixed; some components to measure financial inclusion are inherently subjective. A more in-depth and well-defined analysis from both the demand and supply side to construct a comprehensive indicator to examine the extent of financial inclusion in rural China is needed.

To understand the reasons why people choose not to participate in the formal financial sector, we have reviewed various factors and constraints associated with financial exclusion. Financial inclusion is affected by a set of obstacles and their importance varies across different economies. To date, little is known of the context of rural households in China. This chapter also gives a brief overview of the welfare impact of financial inclusion. Although many studies have theoretically explored the benefits of financial inclusion, prior studies mainly focus on macro-level indicators so research at the individual level is scarce and lacks empirical evidence. Therefore, the research gaps on the factors underpinning the use of formal banking services and pathways to financial inclusion in household welfare from Chinese rural households' perspective drive this study.

## **Chapter 3**

### **Data and Research Methodology**

Chapter 3 describes the research data and methodology used in the study. This chapter links the previous two chapters on the literature review and conceptual framework with the subsequent chapter of the empirical results. Section 3.1 introduces the data used in this study. Section 3.2 presents the process of constructing a composite financial inclusion index to evaluate financial inclusion in rural China. Sections 3.3 and 3.4 outline the empirical models used to identify the determinants that affect the degree of financial inclusion, the impact of financial inclusion on welfare at the rural household level, and detailed descriptions of the variables used in this study. Section 3.5 summarizes the chapter.

#### **3.1 Data**

The objective of this study is to provide insights into financial inclusion in rural China and the determinants and constraints related to an inclusive financial system at the rural household level. We collect the number of rural bank branches and residents' data in 2019 from the China Banking and Insurance Regulatory Commission and the National Bureau of Statistics of China, respectively. The household data for this study are based on the China Household Finance Survey (CHFS) carried out by the Survey and Research Centre of Southwestern University of Finance and Economics (SWUFE). The nation-wide survey administers questionnaires to individuals, households and communities, and has been carried out every two years since 2009. To date, the Survey and Research Centre has carried out the nationwide survey five times: 2011, 2013, 2015, 2017, and 2019, comprising five rounds of the China Household Finance Survey (CHFS) and one round of the China Small and Micro Enterprise Survey (CMES). The CHFS adopts stratified sampling, three-stage sampling, and probability proportional to size (PPS) sampling methods. The first step groups counties from the whole country. The second step draws sample communities/villages from the chosen counties. The third step draws households randomly from the communities/villages selected in step two. To ensure the accuracy of the collected data, the sampling methods are combined with quarterly face-to-face or telephone interviews to collect and update sample data.

The CHFS collects micro-level financial information about Chinese households, including financial assets and liabilities, income and expenditure, insurance and social security, demographic characteristics. It provides a comprehensive, detailed description of households' economic and financial behaviour throughout the country. This study uses the fifth round survey in 2019 that

covered 34,363 households (12,336 from rural areas) from 29 provinces (excluding Xinjiang, Tibet, Hong Kong, Macao, and Taiwan), 343 counties, and 1,360 communities in China.

## **3.2 Measures of Financial Inclusion**

### **3.2.1 Variable Selection**

Since the debate persists about a precise definition of financial inclusion or exclusion, we construct a new composite financial inclusion index based on past studies to measure the level of financial inclusion in rural China. This comprehensive measure of financial inclusion must be able to capture several dimensions of financial inclusion and represent information from both the demand and supply perspectives to reflect the degree of financial inclusion at rural household level. According to the inherent meaning of financial inclusion summarized in Chapter 2, financial inclusion is a multifaceted concept covering a number of nuanced indicators. Although there is no consensus on the definition of financial inclusion, it can be concluded that an inclusive financial system ensures that each individual in the economy can participate in the financial sector and access basic formal financial services. These include saving accounts, credit, loans, mobile transactions, and other traditional banking services (World Bank Group, 2013).

Based on Amidžić et al.'s (2014) and the World Bank Group's (2013) studies, financial inclusion encompasses three major aspects: outreach (i.e., accessibility and availability), use and the quality of financial services. The first dimension represents financial supplies, whereas the other two represent financial demands. Following the proposed financial inclusion index of Sarma (2008) and Amidžić et al. (2014), two dimensions, outreach and use of bank services, are primarily considered since they are the most indispensable components of financial inclusion. The outreach dimension demonstrates the accessibility and service scope of banking services. The use dimension captures the permanence and depth of banking services adoption, which can suggest individual's degree of participation in economic activities in the financial system.

To accurately reflect the two dimensions of financial inclusion discussed above, we select six financial service-related variables from the rural perspective to create a comprehensive financial inclusion index. The outreach dimension consists of the number of bank branches per 1,000 residents and the number of financial service outlets per 1,000 residents in rural areas. The study mainly considers the demographical penetration of banking services because commercial banks are the primary financial services providers in China. For the use dimension, it is noteworthy that most studies used cheque account ownership as the main indicator of financial service use (e.g., Demirgüç-Kunt et al., 2018; Fungáčová & Weill, 2015; Sarma, 2008). Although opening a bank account serves as the gateway to financial services, people with cheque accounts may let them remain dormant or inactive. A high

proportion of checking accounts does not necessarily mean people carrying out day-to-day transactions or saving money if there is a dismal record of account use. As a result, bank account ownership as a measure of financial inclusion to envisage the inclusiveness of the financial system remains meaningless unless those bank accounts are actively used (Iyer, 2015). A robust measure of financial inclusion should capture both financial deepening and financial habits of users to give a holistic picture of the current situation of financial inclusion.

Therefore, we select four variables: the proportion of use of formal savings, credit cards, mobile accounts and commercial insurance, as a measure of financial inclusion use at the rural household level. Unlike the indicators adopted in most previous studies, we consider mobile payment accounts as non-traditional financial services to reflect the current proliferation of digital technology. This is because mobile phone penetration in developing countries has almost tripled in the past few years, particularly in China, showing a high smartphone subscription that could exploit the channels to access financial services (Hannig & Jansen, 2010). Mobile banking services in China are provided primarily through third-party payment service providers (e.g., WeChat and Alipay) using smartphone applications linked to a bank or other type of financial institution's accounts, which is an important component of our financial inclusion index (Chen et al., 2018; Demirgüç-Kunt et al., 2018). Table 3.1 presents the definitions of the financial inclusion indicators.

Table 3.1 Indicators in the Composite Financial Inclusion Index

<b>Dimension</b>	<b>No.</b>	<b>Indicator</b>	<b>Definition</b>
<i>Outreach</i>	1	The number of bank branches/1,000 residents	The number of bank branches in rural areas divided by the rural population
	2	The number of financial service-outlets/1,000 residents	The number of financial service-outlets in rural areas divided by the rural population
<i>Use</i>	3	The proportion of rural households with saving accounts	The number of households with saving accounts divided by the total number of rural households
	4	The proportion of rural households with mobile payment accounts	The number of households with mobile payment accounts divided by the total number of rural households
	5	The proportion of rural households with credit cards	The number of households with credit cards divided by the total number of rural households
	6	The proportion of rural households with commercial insurance	The number of households with commercial insurance divided by the total number of rural households

After selecting relevant indicators for each dimension, we propose the computing methods of the Human Development Index (HDI) proposed by UNDP, combined with the standardized processing of indices by Sarma (2008) and the weights assigned by using an entropy method based on Hu et al. (2021). In general, the process of constructing a multidimensional financial inclusion index includes

the following three steps: (1) normalization of variables; (2) the entropy method to assign weights for each sub-index; and (3) aggregation of sub-indices.

### 3.2.2 Normalization of the Variables

According to Freudenberg (2003), the technical choices (i.e., weights, thresholds, decision rules of combining indicators) in constructing a composite index materially affect the resulting score.

Variables measured in different magnitudes or statistical units do not contribute equally to the level of financial inclusion, which could result in biased and misinterpreted results. To compile various indicators into a synthetic index, all indicators need to be normalized to smooth out the range and data variability from different scales and transform them into a more analytically comparable form before aggregating them into composite indicators. Common normalization techniques are standardization, Min-Max method and transformation in index numbers. We follow Sarma's (2008) Min-Max method to normalize dimensional variables. The equation is follows:

$$d_i = \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

where:

$A_i$  = actual value of variable  $i$ , and  $i$  ranges from 1 to 6;

$m_i$  = minimum value of variable  $i$ , and  $i$  ranges from 1 to 6; and

$M_i$  = maximum value of variable  $i$ , and  $i$  ranges from 1 to 6.

The normalization process lets us rescale each variable into an equal scale with range [0, 1], where the higher the value, the higher the financial inclusion in dimension  $i$  at the province level.

### 3.2.3 Assigning Weights

According to Jacobs et al. (2004), appropriate weights are essential to value judgments about the relative significance of different performance indicators in achieving an inclusive financial system.

The rationale for specifying a differential set of weights is that the attached weights profoundly impact the outcome of the composite index. Undeniably, a slight change in the weights assigned can dramatically change the ranking of specific indicators. Therefore, variables that are aggregated into a composite indicator need to be assigned weights to reflect the significance and reliability of the underlying data.

In previous studies, most composite indicators assigned equal weights to all variables because of: (1) its simplicity; (2) a lack of a theoretical framework to justify the appropriate weighting approach; and (3) no agreement among researchers, e.g., the IFI index proposed by Sarma (2008) and the arithmetic Human Development Index by UNDP before 2010. This implies that each indicator and dimension contribute equally to the financial inclusion index. On the other hand, some studies (e.g., Chakravarty

and Pal (2013), Sarma (2012) and Park and Mercado (2015) use a subjective weighting scheme that originated from authors' perceived importance of each indicator, which is criticized for bias. However, each weighting scheme has its pros and cons, and there is no 'one-size-fits-all' solution. Adequate weighting depends on the purpose of index construction (Greco et al., 2019). We use the entropy method to reflect the statistical importance of the variables and assign weights. The entropy method is widely used in socio-economic studies; it allows us to understand the extent of uncertainty or variation corresponding to the amount of information used in the study (Liu et al., 2017). In general, when the contained information is rich, accordingly, the degree of uncertainty is low, the entropy value will be small, and vice versa. In this method,  $k$  indicators and  $n$  samples are used in the calculation, where  $k$  ranges from 1 to 6, indicating the six dimensions of the financial inclusion index,  $n$  represents 29 provinces in this study. The calculation method is as follows:

First, we calculate the value of  $p_{ij}$ , which denotes the normalized indicator  $i$  of the  $j^{th}$  province as a percentage of the sum of the  $i^{th}$  indicator across all provinces:

$$p_{ij} = \frac{d_{ij}}{\sum_{j=1}^n d_{ij}} \quad (2)$$

The entropy value  $E_i$  of the  $i^{th}$  indicator is defined as:

$$E_i = -\frac{1}{\ln(n)} \times \sum_{j=1}^n p_{ij} \ln(p_{ij}) \quad (3)$$

where: the  $p_{ij} \ln(p_{ij}) = 0$  is generally set when  $p_{ij} = 0$  for the convenience of calculation in the actual use of entropy weight method. The weight of the  $i^{th}$  indicator is therefore:

$$w_i = \frac{1 - E_i}{\sum_{j=1}^k (1 - E_i)} \quad (4)$$

### 3.2.4 Aggregation of the Variables

The final step in constructing the composite financial inclusion index is the aggregation of the variables. We follow the method of Sarma (2008) and HDI, which uses arithmetic mean in calculating the financial inclusion index. It can be expressed as:

$$FII = \sum_{i=1}^k w_i \times d_i \quad (5)$$

## 3.3 Empirical Model (I): Determinants of Financial Inclusion in Rural China

This study aims to investigate the level of financial inclusion and explore the determinants of households' financial exclusion, particularly the incidence of rural households' characteristics, to understand the reasons why people do not participate in the financial system. Common models to analyse the determinants of financial inclusion are the Logit and Probit models. Both models specify the probability of the choice of an option made by each individual among the options available to

them. They can then be used to gauge the people's choices under different demographic and social-economic characteristics or attributes of the options (Sanderson et al., 2018). We use the Probit model based on Tuesta et al. (2015) and Lotto (2018) to analyse the determinants of financial inclusion and certain variables of interest at the micro-level in rural China. The Probit model is widely used in econometric analysis. It is appropriate for this study where the dependent variable is dichotomous with the value of zero or one.

$$y_i^* = x_i' \beta + \varepsilon_i \quad (6)$$

$$y_i = 1 \text{ if } y_i^* > 0; y_i = 0 \text{ if } y_i^* \leq 0 \quad (7)$$

where: the subscript  $i$  denotes rural household  $i$ ,  $\beta$  is a vector of parameters; and  $\varepsilon$  represents a normally distributed error term with  $E(\varepsilon) = 0$  and  $Var(\varepsilon) = 1$ .

According to Akudugu (2013), when individuals choose to be financially included or excluded, there is a reaction threshold inherent in them based on a set of factors. Beyond a given threshold, the person will seek to be excluded from the formal financial system, whereas at the critical threshold level, the motive to be included in the formal financial system is stimulated. In this case,  $y_i$  is assumed to be the critical threshold, if  $y_i^*$  is over  $y_i$  then a household is included in the financial system. but  $y_i$  is not observable. It is assumed to be distributed normally with a mean of zero and a variance of one. Thus, it lets us estimate the regression parameters and obtain information on  $y_i^*$ :

$$P_i = P(y_i = 1 | x_i') = P(y_i \leq y_i^*) = P(Z_i \leq x_i' \beta) = F(x_i' \beta) \quad (8)$$

where:  $Z$  is a standard normal variable,  $Z \sim N(0, \sigma^2)$  and the cumulative distribution function of a normal variable is  $F = \left(\frac{1}{\sqrt{2\pi}}\right) \int_{-\infty}^{\beta x_i'} e^{-z^2/2} dz$ . The model is then estimated using the Maximum Likelihood method.

Given that financial inclusion is a multidimensional phenomenon involving not only access to a bank account but a series of financial services, we use the use dimension of financial inclusion to better understand the determinants of financial inclusion at rural household level. These include the use of a savings account, mobile payment account, credit card and commercial insurance.

The socio-demographic characteristics of rural households might affect households' decision to be financially included or excluded. Thus, we consider a wide range of explanatory variables available from the CHFS 2019 dataset that are in the literature, including household head's characteristics (gender, age, education level, employment status, local official status, financial literacy), and household-level characteristics (family size and income). Descriptions of the variables are summarized in Appendix Table A.1.

### 3.3.1 Explanatory Variables

#### Household Head's Characteristics

**Gender:** Household head's gender (denoted as *Gender*) indicates whether the household head is a male (=1) or female (=0). The World Bank Group 2017 dataset shows that access to formal financial services is different between men and women. Gender inequality in account ownership with 56% of unbanked adults being women (Demirgüç-Kunt et al., 2018). This gender gap persists across economies and within-country income classes. According to Fungáčová and Weill (2015), women are less likely to report having a bank account or formal loan. Chinese households are usually male headed; they have the most influence on financial decision-making. Males tend to have more exposure to information leading to more financial activity than females. Thus, the effect is expected to be positive (Lawal et al., 2009).

**Age:** The household head's age<sup>1</sup> (*Age*), a continuous variable, is frequently cited in previous studies. Abdu et al. (2015) indicate that older age could reduce the likelihood of a household being financially included. This might be because younger generations tend to be more receptive to new digital technologies and better educated regarding the finance-related knowledge. We therefore use the square of centralized age ( $Age^2$ ) in the regression model to capture whether there is any U-shaped impact of age on the use of financial services.

**Education:** For education level, Allen et al. (2016) find that adults in developing with a tertiary education are more than twice as likely to have a bank account as people with only primary education. We consider three dummy variables for education, equal to one if the highest education level of household head is junior high education (*Junior high education*), senior high education (*Senior high education*) or tertiary education (*Tertiary education*), zero otherwise. We expect the education level to be positively related to financial inclusion, because better educated household heads have the ability to analyse the costs and benefits of formal financial services and, therefore, have a more positive effect on households' access to financial capital (Lawal et al., 2009).

**Political status:** A dummy variable of communist party (*communist party*) is used to capture the social capital of households, which equals one if the household head's political status is communist party member and zero otherwise. The households' political connections give opportunities to access various social and economic resources through political networks, and being a member of the

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<sup>1</sup>The CHFS survey provides the birth year of the household head person, and we calculate the actual age of the household head using 2019 minus the birth year.

communist party in China is found to be positively correlated with the use of formal financial resources (Chen & Jin, 2017).

**Employment status:** The employment status of a household head is expected to be positively associated with the households financial decisions, since employed people tend to be more aware of and have easy access to banking services such as saving and borrowing (Damodaran, 2013; Soumaré et al., 2016). We break employment status into four dummy variables based on the household head's occupation type. Each equals one if the household head's employment status is farmer (*Farmer*), temporarily employed (*Temporary worker*), employed by someone or some units (*Employee*) or self-employed (*Self-employed*).

**Financial literacy:** Like the definition of financial inclusion, the concepts and measures of the explanatory variable financial literacy are mixed in previous studies. Some researchers, such as Martínez et al. (2013) and Demirgüç-Kunt and Klapper (2013), use education level as a proxy for financial literacy partly because studies lack the appropriate data, or misunderstood the definition of financial literacy since there are gaps that persist in defining and establishing causal links between education level, financial knowledge, and financial behaviour (Hung et al., 2009). The definitions of financial literacy can be categorized as “knowledge of key financial concepts” (Remund, 2010); “ability to understand and apply human capital to manage personal finance” (Huston, 2010); and “ability to read, analyse, communicate about personal financial conditions and financial issues” (Anderson et al., 2000). The CHFS 2019 survey questions on household financial literacy mainly focus on the three aspects: interest rate, inflation, and risk perception, to assess how well an individual understands basic financial-related knowledge to reflect the degree of household financial literacy. Note that the question assessing the financial knowledge of risk perception was asked only of respondents at the city level.

Drawing upon research conducted by Yin, Song and Wu (2014), and Zhang and Yin (2016), we use a composite of financial literacy on interest rate and inflation rate to construct financial literacy index (denoted as *Financial literacy*). Previous studies (e.g., Lusardi & Mitchell, 2011; Van Rooij et al., 2011) point out that the importance of recognizing the difference between ‘incorrect answer’ and ‘I do not know’, because the incorrect responses contain useful information that indicate different levels of financial literacy. Therefore, we exploit two dummy variables for each question on interest rate<sup>2</sup>

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<sup>2</sup> The question or fin\_lit1 from the CHFS survey is “Assuming the annual bank interest rate is 5%, if you deposit 100 yuan for 1 year, what is the principal and interest earned after 1 year?: 1. Less than 105 yuan; 2. Equal to 105 yuan; 3. More than 105 yuan; 4. Do not know”. Fin\_lit1A is set equal to 1 when the household gives an answer of 1, 2, or 3; 0 otherwise. Fin\_lit1B is set equal to 1 when the household gives an answer of 2, 0 otherwise.

(*fin\_lit1a* and *fin\_lit1b*), inflation rate<sup>3</sup> (*fin\_lit2a* and *fin\_lit2b*). The first dummy variable represents whether the answer is correct and the latter dummy variable indicates 'do not know' answers. In addition, we adopt factor analysis on the four variables to derive a comprehensive financial literacy index. Factor analysis is a data reduction technique that is used to explore relationships among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors.

Before conducting the factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is applied to test the applicability of factor analysis. The KMO test indicates the strength of the partial correlation among variables, thus a KMO value greater than 0.5 is considered plausible to conduct factor analysis. Bartlett's test of sphericity<sup>4</sup> was used to test the correlation of the indicators (Bartlett, 1937). Factor analysis is suitable the p-value from Bartlett's test of sphericity is lower than the chosen significance level, i.e., the correlation matrix of the variables diverges significantly from the identity matrix, otherwise there is no scope for dimensionality reduction (Kumar, 2013). The results of the factor analysis to construct a financial literacy index are described in the following tables:

Table 3.2 Factor Analysis Results

<b>KMO and Bartlett's Test</b>		
Kaiser-Meyer-Olkin mssure of sampling adequacy		.651
Bartlett's test of sphericity	Approx. Chi-square	16184.797
	df	6
	Sig.	.000

Source: Author's calculations

Table 3.3 Total Variance Explained

Component	Initial Eigenvalue			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.387	59.672	59.672	2.387	59.672	59.672
2	.890	22.246	81.918			
3	.425	10.631	92.549			
4	.298	7.451	100.000			

Source: Author's calculations

<sup>3</sup>The question for *fin\_lit2* from the CHFS survey is "Assuming the annual bank interest rate is 5%, the inflation rate is 8% a year, if you put 100 yuan in the bank for a year and things you can buy will be: 1. More than one year ago; 2. Same as one year ago; 3. Less than one year ago; 4. Do not know". *Fin\_lit2A* is set equal to 1 when the household gives an answer of 1, 2, or 3; otherwise 0. *Fin\_lit2B* is set equal to 1 when the household gives an answer of 3, 0 otherwise.

<sup>4</sup>The null hypothesis is: the correlation matrix is an identity matrix.

Table 3.4 Component Matrix<sup>a</sup>

	Component 1
Finlit1A	.699
Finlit1B	.821
Finlit2A	.752
Finlit2B	.811

a. 1 components extracted

Source: Author's calculations

**Household Characteristics:** For the household characteristics, income level is frequently used to analyse the determinants of financial inclusion. Most studies, such as Allen et al. (2016), Fungáčová and Weill (2015), and Hannig and Jansen (2010), have shown that income level has a significant positive impact on the use of formal financial services. We therefore consider four dummy variables from the poorest (*Income\_Q1*) to the fourth (*Income\_Q4*) income quintile to capture household income level, the omitted variable is the fifth income quintile (the richest 20%). The variable household size (*Familysize*), which indicates the number of people in the household, is also considered in our estimates.

### 3.4 Empirical Model (II): The Impact of Financial Inclusion on Household Welfare

#### 3.4.1 The Measurement of Household Welfare

Household welfare in past studies is usually measured by either consumption or income (e.g., Iddrisu & Danquah, 2021; Mallick & Zhang, 2019; Mwangi & Atieno, 2018; Zhang & Posso, 2019). However, there is a debate about favouring consumption over income as an indicator of household living standards, especially in developing nations. Deaton and Zaidi (2002) advocate consumption as a better indicator to reflect long-term income because it disregards the short-term fluctuations in income and is less volatile than income. Income is more volatile because of seasonal patterns, which may lead to either exaggerated or underestimated income level. Consumption is regular in terms of production cycles especially in an agriculturally dominated economy, therefore it better represents rural households' living standard. In addition, it is difficult to measure individual income accurately, since it tends to be a more sensitive issue for survey respondents, especially for households that are self-employed or working in the informal sector (Moratti & Natali, 2012). Therefore, we select a consumption-based measure of household welfare to investigate the causal relationship between financial inclusion and household welfare.

We use the same CHFS 2019 dataset to measure household consumption expenditure. The CHFS 2019 dataset covers various types of consumption including: 1) food consumption; 2) non-food expenditure (healthcare, education, other non-food); 3) housing expenditure (rent, utilities); and 4) durable products. Following the study by Iddrisu and Danquah (2021), we use the simple ordinary

least squares (OLS) technique to investigate the welfare impact of financial inclusion at household level. The empirical model specification can be expressed as:

$$y_i = \beta FE_i + \gamma X_i + \alpha_i + \varepsilon_i \quad (9)$$

where:  $y_i$  is the dependent variable representing total annual consumption of household  $i$ ; variable  $FE_i$  refers to the measure of financial exclusion or deprivation status of household  $i$ ; and  $X_i$  is a vector of control variables that have been identified in past studies. They are household demographic characteristics: age, gender, family size, education level, marriage status, employment status, ethnicity, and Hukou (agricultural residence permit). These variables will enrich our understanding of how financial inclusion combined with household characteristics can facilitate household welfare at the micro-economic level. The variable  $\alpha_i$  is a region-level dummy variable that controls for geographical characteristics and  $\varepsilon_i$  is the normally distributed error term. The descriptions of the model variables are given in Appendix Table A.1.

Because the inactive use of bank accounts remains a major concern in China, we consider whether the use dimension of financial inclusion (proxied by use of deposit and mobile accounts, credit cards, and commercial insurance) can improve rural household welfare in China to examine the effect of financial inclusion (proxied by financial deprivation score) on total household consumption. We investigate the importance of each of the four indicators as a single measure of financial inclusion in improving household welfare. This is used to answer the question of which channel of financial inclusion is the most important in explaining the improvement of household living standards. We also adopt a series of robustness tests to check the sensitivity of our analysis.

The composition of the four indicators of financial inclusion *use* method follows the studies by Iddrisu and Danquah (2021) and Alkire and Santos (2011) for the computation of a Multidimensional Poverty Index since this is the most prominent method to measure financial deprivation at the household-level. Specifically,  $FE_i$  is a binary variable equal to one if the household is completely excluded. This is calculated based on the financial deprivation score (the maximum score equals one) with the four indicators equally weighted. The score for each indicator is then summed to obtain the overall household deprivation score, which reflects the extent to which a household is financially deprived. The details of financial deprivation score computation and associated indicators are described in Table 3.5. We follow Zhang and Posso (2019) who selected a cut-off score of 0.5 as half of the four indicators to distinguish whether a household is financially included or excluded. In other words, if the total deprivation score of a household is greater than 0.5, the household is said to be financially excluded, and vice versa. This procedure allows us to calculate a binary measure of financial exclusion to categorize households into financially excluded and included households. We

select a cut-off score of 0.75 to check the robustness of our measure in computing the financial deprivation score.

Table 3.5 The Calculation of the Financial Deprivation Score

Indicators of financial inclusion use	Weight	Deprived if
Saving account	¼	Household does not have a term deposit
Mobile payment account	¼	Household does not have a mobile payment account
Credit card	¼	Household does not have a credit card
Commercial insurance	¼	Household does not have any commercial insurance

Equation (9) may suffer potential endogeneity since an increase in household consumption or welfare could lead to households accessing more financial services and choosing to become financially included. Conversely, the extent of financial deprivation could also affect household welfare. Consequently, we adopt the propensity score matching (PSM) approach of Rosenbaum and Rubin (1983) to account for potential endogeneity and selectivity bias. There are four steps in PSM: 1) determine the observational covariates and estimate propensity scores; 2) balancing test; 3) computing the treatment effect by selecting appropriate matching methods; and 4) a sensitivity test to justify the robustness of the estimated average treatment effect on the treated (ATT). Caliendo and Kopeinig (2008) argue that there are pros and cons in selecting different matching algorithms when calculating a propensity score. We therefore adopt multiple matching algorithms, including nearest-neighbour, kernel, radius, and local linear regression methods to ensure the reliability of our PSM results.

### 3.5 Chapter Summary

The chapter outlines the data and research methods applied in the investigation. First, we use data from CHFS in 2019 to answer the research questions. Second, the methods to construct the Human Development Index (HDI) combined with financial inclusion index proposed by Sarma (2008) are used to measure the financial inclusion level in rural China. Based on data availability, we consider two dimensions, the outreach and use of banking services, to construct a comprehensive financial inclusion index representing rural households' perspective at the micro-level. We use the entropy approach to assign weights for each dimension sub-index. Third, the probit model is used to investigate the determinants that affect rural households' participation in the financial system in terms of four use indicators: savings account, mobile account, credit cards, and commercial inclusion. Fourth, we adopt the OLS technique to investigate whether being financially included improves households' livelihood focussed on household consumption. The next chapter presents and discusses the empirical results of the empirical model to understand the extent of financial inclusion and the determinants of financial exclusion in rural China, and the impact of being financially included on welfare at the rural household level.

## **Chapter 4**

### **Results and Discussion**

This chapter reports the empirical results using the models discussed in Chapter 3. Section 4.1 presents both single measure and composite financial inclusion indexes at the rural household level for 29 provinces in China. This reflects the actual status of financial inclusion in rural China in 2019. Section 4.2 discusses the descriptive statistics of variables used in the study. Section 4.3 presents the results from the empirical model of the determinants of financial inclusion regarding household characteristics. Section 4.3 describes the impact of financial inclusion on household living standards, the transmission channels through which aspects of financial inclusion can improve household welfare, and diagnostic test results for OLS estimates. Section 4.5 concludes the study's findings.

#### **4.1 The Level of Financial Inclusion in Rural China**

##### **4.1.1 An Overview of the Financial Inclusion Status in Rural China**

Table 4.1 presents the values of six financial inclusion indicators for 29 provinces before normalization in 2019. The table shows Shanghai has the highest level in the outreach of financial services in terms of the greater number of bank branches (1.38) and service points (1.29) per 1,000 rural residents. Yunnan and Guizhou have the lowest number (0.217) of bank branches per 1,000 residents and service points (0.27) per 1,000 residents, respectively. For the use of financial services, the results show that, on average, 12.33 percent of rural households report currently having a term deposit, but those who report using credit cards is strikingly low (6.15 percent). The results agree with the findings of Fungáčová and Weill (2015) and Chen and Jin (2017), who find that China has a high proportional use of formal savings but the use of formal credit is much less, especially for rural households and small-medium enterprises. There is a high share of mobile payment account use (34.13 percent) in rural China. This agrees with the study by Demirgüç-Kunt et al. (2018) which shows that China had 68 percent of banked people using digital payment in 2017. The popularity of digital accounts is explained by households having begun to embrace financial innovations and technology. Regional disparity is evident, which accounts for the use of different financial services. Tianjin has the highest proportion of savings account use, 25.51 percent. Guangzhou shows the highest proportion of mobile payment account use of 47.6 percent, i.e., almost half of rural households in Guangzhou currently have a mobile payment account. Ningxia has the highest percentage of credit card use (13.36 percent), whereas Shaanxi is ranked highest in the uptake of commercial insurance (22.7 percent).

Table 4.1 A Summary of Financial Inclusion Indicators by Chinese Province (2019)

Province	Outreach		Use Type			
	Bank branches/ 1,000 residents	Service points/ 1,000 residents	Savings account use	Mobile account use	Credit card use	Commercial insurance use
Anhui	0.299	0.290	12.52%	29.81%	4.76%	10.41%
Beijing	1.374	1.158	20.66%	32.23%	4.96%	12.40%
Chongqing	0.513	0.473	21.63%	20.23%	3.26%	6.98%
Fujian	0.515	0.610	9.69%	43.80%	8.72%	13.18%
Gansu	0.316	0.297	5.02%	28.21%	5.64%	11.60%
Guangdong	0.497	0.505	6.89%	47.60%	9.39%	12.73%
Guangxi	0.264	0.288	6.53%	37.09%	4.15%	10.39%
Guizhou	0.264	0.270	5.18%	35.20%	6.83%	4.35%
Hainan	0.392	0.459	3.43%	37.99%	5.39%	5.64%
Hebei	0.358	0.352	21.45%	39.10%	4.84%	15.40%
Heilongjiang	0.396	0.314	5.16%	30.16%	4.08%	14.95%
Henan	0.290	0.282	8.18%	29.45%	4.55%	12.73%
Hubei	0.347	0.377	11.41%	33.88%	5.43%	12.50%
Hunan	0.310	0.297	11.18%	36.59%	5.49%	13.21%
Inner Mongolia	0.572	0.515	0.69%	31.14%	9.34%	12.11%
Jiangsu	0.596	0.673	24.50%	33.62%	9.40%	12.54%
Jiangxi	0.357	0.384	12.53%	31.57%	5.06%	8.92%
Jilin	0.423	0.426	5.57%	28.91%	4.24%	10.34%
Liaoning	0.661	0.582	19.17%	24.44%	2.22%	9.72%
Ningxia	0.475	0.504	12.96%	42.11%	13.36%	20.24%
Qinghai	0.359	0.364	0.92%	46.46%	5.85%	5.23%
Shaanxi	0.442	0.424	12.06%	36.41%	8.51%	22.70%
Shandong	0.413	0.436	20.48%	31.93%	5.42%	13.86%
Shanghai	1.380	1.290	21.05%	36.84%	5.26%	7.89%
Shanxi	0.436	0.384	13.43%	27.03%	6.30%	8.13%
Sichuan	0.324	0.365	16.24%	30.85%	5.22%	9.69%
Tianjin	1.168	1.164	25.51%	37.76%	4.08%	19.39%
Yunnan	0.217	0.279	5.34%	34.25%	7.40%	10.50%
Zhejiang	0.799	0.912	18.11%	35.04%	9.25%	7.87%
Max	1.380	1.290	25.51%	47.60%	13.36%	22.70%
Min	0.217	0.270	0.69%	20.23%	2.22%	4.35%
Mean	0.509	0.506	12.33%	34.13%	6.15%	11.57%
Std. Dev	0.306	0.280	0.073	0.062	0.024	0.043

Source: Author's calculations

The composite financial inclusion index is constructed by using equation (3.5) (see Chapter 3) after assigning the weights calculated using the entropy method. The weights derived for each indicator are given in Table 4.2.

Table 4.2 Weights Assigned to Each Financial Inclusion Indicator

Dimension	No.	Indicator	Weights
Outreach (58.72%)	1	Number of bank branches/1,000 residents	24.98%
	2	Number of financial service-outlets/1,000 residents	33.74%
	3	Proportion of rural households with saving accounts	13.14%
Use (41.28%)	4	Proportion of rural households with mobile payment accounts	6.59%
	5	Proportion of rural households with credit cards	10.61%
	6	Proportion of rural households with commercial insurance	10.94%

Source: Author's calculations

With regard to the weighting scheme for each financial inclusion indicator, the outreach dimension has relatively higher importance with a weight of 58.72 percent. This means that the outreach dimension contains more information than the use dimension for measuring the extent of financial inclusion. This can be explained by the fact that banking penetration is a precondition for customers to conveniently access financial products and services, which is considered the key facilitator for achieving inclusive finance. According to the dimension sub-index, the number of financial service outlets per 1,000 residents accounts for just over a third, 33.74 percent, of information relative to the whole financial inclusion index. Under the use dimension, the proportion of households with saving accounts has a weighting of 13.14 percent, the highest, which implies that this variable contains more information to explain the overall use of financial services. The high importance of the variable 'use of formal savings' speaks to the fact that having a term deposit is highly responsible for attracting people into the financial system.

#### 4.1.2 The Financial Inclusion Index

Table 4.3 displays the list of the weighted normalized values of two financial inclusion dimensions and the composite financial inclusion index at the rural level for 29 provinces in China. The computation of the financial inclusion index for each province can be helpful for the Chinese government and policymakers to implement financial inclusion strategies for each province based on the comparison ranking. The results indicate that different provinces in China are at different levels of financial inclusion, ranging from a minimum score of 0.11380 (Guizhou) to a maximum score of 0.78512 (Shanghai). In the ranking, Shanghai leads composite financial inclusion index, followed by Tianjin, Beijing, and Zhejiang. Guizhou, Guangxi, and Yunnan are ranked at the bottom in both the dimension and overall financial inclusion index scores across the country, showing that the financial inclusion development in these provinces lags far behind the others. This reflects the findings by Turvey and Xiong (2017) that there is substantial variability across provinces, even in rural areas.

Table 4.3 The Financial Inclusion Index Level by Region (2019)

Province	Outreach	Use	Financial Inclusion Index	Ranking
Beijing	0.54216	0.20869	0.75085	3
Fujian	0.17639	0.21900	0.39539	7
Guangdong	0.13782	0.21712	0.35493	9
Hainan	0.10038	0.09521	0.19558	21
Hebei	0.05749	0.24626	0.30374	12
Jiangsu	0.21482	0.27551	0.49033	5
Liaoning	0.19848	0.14000	0.33847	10
Shandong	0.09686	0.22012	0.31698	11
Shanghai	0.58717	0.19795	0.78512	1
Tianjin	0.50013	0.28101	0.78114	2
Zhejiang	0.33736	0.21589	0.55325	4
<b>Eastern Region</b>	<b>0.26809</b>	<b>0.21061</b>	<b>0.47871</b>	
Anhui	0.02419	0.14601	0.17021	23
Heilongjiang	0.05304	0.12845	0.18150	22
Henan	0.01959	0.13397	0.15356	25
Hubei	0.06349	0.16886	0.23235	15
Hunan	0.02904	0.17890	0.20794	19
Jiangxi	0.06764	0.14426	0.21191	18
Jilin	0.09596	0.10176	0.19772	20
Shanxi	0.08487	0.14522	0.23009	16
<b>Central Region</b>	<b>0.05473</b>	<b>0.14343</b>	<b>0.19816</b>	
Chongqing	0.13072	0.13634	0.26707	14
Gansu	0.03003	0.11794	0.14797	26
Guangxi	0.01629	0.12595	0.14225	28
Guizhou	0.01007	0.10373	0.11380	29
Inner Mongolia	0.15735	0.14040	0.29775	13
Ningxia	0.13287	0.31850	0.45137	6
Qinghai	0.06176	0.10426	0.16602	24
Shaanxi	0.09913	0.26843	0.36756	8
Sichuan	0.05446	0.16828	0.22274	17
Yunnan	0.00286	0.14438	0.14725	27
<b>Western Region</b>	<b>0.06955</b>	<b>0.16282</b>	<b>0.23238</b>	

Source: Author's calculations

Given the statistical importance of the outreach dimension in constructing the composite financial inclusion index, provinces such as Guangxi, Guizhou, Yunnan and Gansu need to improve their accessibility to financial services by increasing the number of banking branches and service outlets. In addition, the popularity of mobile payment accounts among rural households will expand the delivery channels for basic financial services, which benefit these less developed provinces' future development of inclusive finance.

At the regional level, rural households in the eastern region have the highest level of financial inclusion in terms of both the single measures (i.e., outreach and use) of financial inclusion and the

composite financial inclusion index. While those living in the central region report a dismal performance being the lowest financial inclusion index. The results are consistent with Hu et al.'s (2021) assertion that eastern areas, particularly coastal areas, have the highest degree of financial inclusion of the regions. This is because eastern provinces in China are more advanced in business and industrial activity with relatively better access to credit and government investments than other regions. Although the western region is less economically developed, the financial inclusion index of the western region is higher than for central provinces. This can be explained by the western region having a smaller population density which leads to a higher average score in terms of per capita indicators, and provinces in the west getting more government support with stimulation initiatives such as the national poverty alleviation program (Sparreboom & Duflos, 2012).

## 4.2 Descriptive Statistics

Appendix Table A.1 shows the descriptive statistics of the variables used in this study. The results show that 85.7% of rural household respondents (12,022) in CHFS 2019 were financially deprived, as measured by financial deprivation score (see details in Chapter 3). Specifically, the average adoption rates of the four types of financial services are 11.9% (savings), 33.9% (mobile payment account), 6.2% (credit card), and 11.3% (commercial insurance). These figures show that only a minority of rural households in this study use formal financial services.

For household head characteristics, the age of the household head ranges from 17 years to 102 years; most household heads are male (84.8%). This is reasonable since most Chinese families are male-headed based on the study by Fungáčová and Weill (2015). The great majority of the household heads are married (86.3%) and Han Chinese (89.3%) with agricultural residents' permits (Hukou) accounting for 92.8%. With regard to the employment status, household heads types of employment in the sample can be categorized as farmers, temporary work, employed by someone or some units, self-employed, and unemployed. The average proportions of the five employment types are 54%, 14.7%, 6%, 5.3%, and 20%, respectively, indicating that over half of rural household heads are engaged in farming. For educational attainment, 51.3% of the rural household heads have a highest education level of primary school, which implies that half of household heads have only a basic education. The average proportions of household heads whose highest education achievements are junior high education, secondary education, and tertiary education are 36.3%, 10.9%, 1.5%, respectively. More importantly, 12.8% of the household heads are communist party members and 28.6% have a certain degree of financial knowledge. These figures reflect that the rural household heads in the sample data have low levels of social capital and financial literacy.

With regard to household demographics, the minimum and maximum household sizes are 1 and 12, respectively. The average family size of rural households in the sample data is 3.268, indicating

approximately three members per rural household. The natural logarithm of household annual total consumption expenditure ranges from 7.212 to 14.663. The income levels of rural households are divided equally into five quintiles income from the poorest to the richest. The mean value for the region is 1.981, which reflects that most rural households are from central provinces.

### 4.3 The Empirical Results of the Determinants of Financial Inclusion in Rural China

Appendix Tables A.2 and A.3 show the correlation matrixes of independent variables used in our empirical models. Correlations with different signs indicate varied movement directions. All correlation coefficients in both matrixes are well under the general rule-of-thumb value 0.8 suggested by Midi et al. (2010). This indicates a low probability of multicollinearity. Note that the variable age squared is omitted from the correlation matrix. In addition, a variance inflation factor (VIF) examination was conducted to further diagnose for multicollinearity. The test results for the explanatory variables in both empirical models are reported in Appendix Tables A.4 and A.5, respectively. Table A.4 shows the mean VIF and the VIFs for most variables are under the cut-off point of 10 recommended by Chatterjee and Hadi (2012). The exceptions are age and age squared. This is because of the presence of the age squared term. This problem is resolved by omitting the squared term. All the variables in Appendix Table A.5 are within the acceptable range, indicating the absence of multicollinearity in our study.

Table 4.4 provides the distribution of demographic groups for the four dimensions of the financial inclusion index. It is clear that differences exist across demographic groups, such as gender, marital status, age, employment type, educational status, and income level are important determinants of financial inclusion.

Table 4.4 Financial Inclusion by Demographic Groups in Rural China

	Use of saving account	Use of mobile account	Use of credit card	Use of commercial insurance
<b>Gender</b>				
Male	88.72%	75.34%	87.97%	87.93%
Female	11.28%	24.66%	12.03%	12.07%
<b>Marriage</b>				
Yes	92.01%	91.80%	91.49%	92.64%
No	7.99%	8.20%	8.51%	7.36%
<b>Education Level</b>				
Basic education	38.22%	34.24%	31.44%	31.59%
Junior high education	45.93%	46.67%	44.44%	48.34%
Secondary high education	14.17%	15.65%	18.29%	16.38%
Tertiary education	1.68%	3.45%	5.83%	3.69%

<b>Respondent Age</b>				
17-24	0.00%	0.20%	0.00%	0.07%
25-64	62.51%	88.68%	85.14%	81.90%
65+	37.49%	11.13%	14.86%	18.03%
<b>Income Quintile</b>				
Income Q1	9.99%	5.39%	7.59%	7.67%
Income Q2	14.25%	9.37%	8.17%	9.09%
Income Q3	20.69%	20.12%	16.94%	19.92%
Income Q4	24.17%	25.35%	19.34%	22.45%
Income Q5	30.90%	39.77%	50.14%	40.87%
<b>Employment status</b>				
Farmer	50.67%	44.47%	39.65%	47.68%
Temporary Worker	17.94%	21.10%	17.86%	18.35%
Employee	8.90%	11.29%	14.61%	10.46%
Self-employed	7.50%	11.07%	13.94%	10.17%
Unemployed	15.00%	12.08%	13.94%	13.34%
<b>HuKou</b>				
Yes	90.95%	90.78%	87.96%	91.46%
No	9.05%	9.22%	12.04%	8.54%
<b>Communist Party</b>				
Yes	16.76%	15.07%	23.37%	14.41%
No	83.24%	84.93%	76.63%	85.59%
<b>Financial Literacy</b>				
Yes	45.57%	43.36%	51.86%	43.98%
No	54.43%	56.64%	48.14%	56.02%
<b>Region</b>				
Eastern	45.27%	37.56%	37.05%	35.42%
Central	28.97%	30.71%	27.41%	33.46%
Western	25.77%	31.73%	35.54%	31.12%

Source: Author's calculations

Empirical research typically cites the marginal effects since they are intuitive and easy to digest. In a linear regression model, the coefficients are marginal effects, which can be treated as partial derivatives. This makes the linear regression model easy to interpret. The coefficients of the probit estimates have no direct interpretation. We should interpret the marginal effects of the regressors, i.e., how much does the (conditional) probability of the outcome variable change when we change the value of a regressor, holding all other regressors constant at some value. The marginal effect indicates the level of importance for the estimated coefficients in the empirical model (Greene, 2003). Table 4.5 shows the probit estimates of the marginal effects.

Table 4.5 The Determinants of Financial Inclusion in Rural China

Independent Variables	(1) Savings account use	(2) Mobile account use	(3) Credit card use	(4) Commercial insurance use
Age	0.003 (0.002)	-0.003 (0.004)	-0.002 (0.002)	0.008*** (0.002)
Age2	0.000 (0.000)	-0.000** (0.000)	0.000 (0.000)	-0.000*** (0.000)
Gender	0.014 (0.010)	0.006 (0.011)	-0.004 (0.007)	-0.001 (0.009)
Family size	-0.012*** (0.002)	0.032*** (0.002)	0.006*** (0.001)	0.009*** (0.002)
Farmer	0.030*** (0.009)	-0.032*** (0.011)	-0.014** (0.007)	-0.001 (0.009)
Temporary worker	0.044*** (0.012)	-0.006 (0.014)	-0.018** (0.009)	-0.006 (0.011)
Employee	0.050*** (0.015)	0.041** (0.018)	0.011 (0.010)	-0.005 (0.014)
Self-employed	0.055*** (0.016)	0.128*** (0.020)	0.021** (0.010)	0.028** (0.014)
Junior high education	0.044*** (0.007)	0.043*** (0.008)	0.008 (0.005)	0.042*** (0.007)
Senior high education	0.028*** (0.010)	0.079*** (0.012)	0.022*** (0.007)	0.048*** (0.010)
Tertiary education	-0.008 (0.027)	0.160*** (0.035)	0.032** (0.014)	0.064*** (0.021)
Income_Q1	-0.144*** (0.012)	-0.275*** (0.013)	-0.059*** (0.009)	-0.112*** (0.011)
Income_Q2	-0.099*** (0.011)	-0.225*** (0.012)	-0.064*** (0.008)	-0.106*** (0.010)
Income_Q3	-0.063*** (0.010)	-0.157*** (0.011)	-0.052*** (0.007)	-0.061*** (0.009)
Income_Q4	-0.020** (0.009)	-0.089*** (0.011)	-0.041*** (0.006)	-0.044*** (0.008)
Financial literacy	0.068*** (0.007)	0.085*** (0.008)	0.033*** (0.005)	0.034*** (0.006)
Communist party	0.002 (0.009)	0.017 (0.011)	0.01 (0.006)	-0.011 (0.009)
Observations	10,417	10,417	10,417	10,417
LRT	494.92***	2887.73***	570.09***	603.71***
Pseudo R2	0.065	0.309	0.127	0.098
Log likelihood	-3655.196	-4614.223	-2106.532	-3285.805
Percent correct predictions	0.876	0.780	0.938	0.889
Mean values of Predicted probability	0.124	0.339	0.062	0.111

Note: Each column represents the probit estimate of the determinants of the four financial inclusion indicators in China. We report the estimated marginal effects. Standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10%, respectively.

Source: Author's calculations

The marginal effects capture the change of probability of financial service use with the value change in the corresponding independent variable, holding other variables constant. In addition, unlike linear regression models, there is no universally accepted goodness-of-fit model for the maximum likelihood estimation (Gujarati, 2003). Therefore, multiple measures are conducted for each model in our study. These include the likelihood ratio test (LRT), Pseudo R<sup>2</sup>, and proportion of correct prediction (see Table 4.5). Specifically, the LRT was used to test the null hypothesis that all estimated coefficients are simultaneously equal to zero (Ochalibe et al., 2016). The null hypothesis was rejected for all models at the 99% confidence level ( $p < 0.001$ ). The Pseudo R<sup>2</sup> values range from 0.065 to 0.309, and the percent correct predictions range from 78% to 93.8%, indicating that the model passed the goodness-of-fit model tests and correctly predicted over 78% of the sample.

We select multiple levels of financial inclusion indicators as the dependent variables to reflect a more accurate picture of an individual household's financial inclusion. These are binary variables indicating whether a household uses formal savings (*Savings account*), a mobile payment account (*Mobile account*), a credit card (*Credit card*), and commercial insurance (*Commercial insurance*). According to Table 4.4, columns (1) to (4), most variables have significant impacts on our four financial inclusion indicators. However, several differences exist compared with the literature. For instance, age and age squared are insignificant in the first three financial inclusion indicators. This contradicts the study by Fungáčová and Weill (2015), who ascertain a significant impact of age on financial services use. Their only exception is the use of commercial insurance. The results are significantly positive for the variable age and significantly negative for age squared, indicating that there is a non-linear relationship between age and commercial insurance use. Household heads of an older age are more likely to be financially included in terms of commercial insurance use, but only up to a certain age. This can be explained by the threshold effect of age, whereby elderly people are more likely to obtain commercial insurance than those who are at a younger age, but the effect wanes after a given age.

The household head's gender has an insignificant impact on financial inclusion, which means gender has no influence in consuming these four types of financial products or services in China's rural households. This result agrees with Tuesta et al.'s (2015) findings in Argentina. Interestingly, the results show that female household heads are more inclined towards using formal credit and commercial insurance but are excluded from financial products such as mobile accounts and deposits. This finding is worth further analysis in subsequent studies. All coefficients of the gender variable are statistically insignificant in our study. Family size, however, is positively correlated with our four financial inclusion measures. The results show that a larger household negatively affects access to formal savings, which agrees with the study of West Africa by Soumaré et al. (2016). Conversely, it favourably influences the use of digital accounts, a credit card, and insurance. This may

be because, as the household's size increases, there is an increasing demand for payment transactions, borrowing, and insurance services to protect family members against external shocks.

Most employment status indicators by occupation type significantly influence the use of financial services. A positive coefficient for the employment status on the use of savings implies that employed people tend to be more active and aware of formal savings. This agrees with the results in Damodaran (2013) that employed individuals have a significant positive effect on banking-related deposit activities. Especially for those who are self-employed, the results suggest that being self-employed increases the likelihood of using the four types of financial services by 5.5, 12.8, 2.1, and 2.8 percent, respectively. However, household heads who participate in farming are negatively correlated with the use of mobile accounts and credit cards. This can be explained by the fact that farmers have less access to digital technology; they tend to borrow money from friends, relatives and pawnshops instead of using formal credit. We did not find any statistically significant relationship in using commercial insurance if the household head is a farmer, temporary worker or employee.

Dummy income variables for the four lowest income quintiles are all statistically significantly negative for our financial inclusion indicators. This shows that there is variation in the use of different financial services between different income quintiles, which implies that as the household incomes increase, the probability of households being financially included increases significantly. This result is consistent with Demirgüç-Kunt and Klapper (2013) who conclude that income is positively related to financial inclusion level.

Like the income level, most dummy variables for education level are significantly positively related to the use of four types of financial services. The magnitude of the impact is evident in the tertiary education category. The results indicate that the probability of households' heads with a tertiary degree to be financially included increases 16 percent, 3.2 percent, and 6.4 percent in terms of using mobile payment accounts, credit cards, and commercial insurance, respectively. However, there is no significant impact for tertiary and junior high education on the use of formal savings and credit cards, respectively. These findings strengthen the results of previous studies such as Chen and Jin (2017), Mohammed et al. (2017) and Zhu et al. (2021), suggesting that education level plays a critical role in improving financial inclusion.

The impact of financial literacy is identical for the four financial inclusion indicators. Financial literacy level is significantly, positively correlated with financial inclusion, indicating that a higher degree of financial literacy means a higher likelihood of participating in the financial market. This corroborates the results of prior studies in other jurisdictions such as Grohmann et al. (2018), Lusardi and Mitchell (2011) and Sanderson et al. (2018). This is because better financial knowledge means better financial capability in participating in formal financial markets that facilitate the uptake of formal savings,

digital accounts, credit, and insurance services. Being a member of the communist party is statistically insignificant, with one exception of mobile payment account use. This contradicts the study by Chen and Jin (2017), who reveal that communist party membership has a significantly positive impact on the use of formal credit.

Overall, the results suggest that household characteristics help explain the use of different financial services, with major discrepancies between our four financial inclusion indicators. Compared with the study by Fungáčová and Weill (2015), the significant determinants of financial inclusion found in China at country level are not necessarily significant in rural regions. The results reveal that financial inclusion is significantly influenced by education attainment, income, employment status, household size and financial literacy. Other factors, communist party membership, household head gender and age, are not statistically significant except for the use of commercial insurance.

## **4.4 The Empirical Results of Financial Inclusion's Impact on Household Welfare**

### **4.4.1 Baseline Results**

In this section, we use the OLS technique to investigate whether there is a welfare disparity among financially deprived and included households. Table 4.6 shows the baseline OLS results of the impact of financial inclusion proxied by financial deprivation score on rural household welfare. The dependent variable is (log) annual total consumption expenditure per household as a measure of household welfare. In all estimations, we use robust standard error at the household level to control for potential heteroskedasticity; regional effects are also controlled in the estimations.

The OLS estimations in Table 4.6 suggest that financial exclusion (FE) is negatively correlated with household welfare at one percent significance level. This means that being financially included suggests a better outcome in improving household consumption expenditure. Specifically, the large coefficient estimate of FE indicates that financially excluded households have less consumption expenditure (approximately 30.5 percent) compared with households that are financially included, implying financially deprived households have a relatively lower level of welfare than their financially included counterparts. This result confirms our expectations that agree with the conclusions of prior studies by Iddrisu and Danquah (2021), Mwangi and Atieno (2018), and Zhang and Posso (2019). For the control variables, the influence of financial inclusion is significantly stronger with household head's age, education level, marriage status, Hukou (agricultural residence permit), and household size. Specifically, tertiary education is a significant predictor of household welfare. A household head with tertiary education or above is approximately 33 percent higher in household consumption expenditure than counterparts with lower education level. One possible inference is that financially included households have better access to various formal financial services, such as savings,

borrowing, and insurance services, that could help households generate income and smooth their consumption.

Table 4.6 Financial Inclusion and Household Welfare

Variable	Dependent variable: (log) household annual consumption	
	Coefficient	Robust S.E.
FE (Financial exclusion)	-0.305***	(0.0201)
Age	-0.013***	(0.0007)
Gender	-0.037	(0.0205)
Family size	0.190***	(0.0050)
Farmer	-0.093***	(0.0195)
Temporary worker	-0.003	(0.0256)
Employee	0.133***	(0.0350)
Self-employed	0.310***	(0.0370)
Junior high education	0.087***	(0.0155)
Senior high education	0.184***	(0.0224)
Tertiary education	0.333***	(0.0584)
Marriage	0.231***	(0.0224)
Ethnicity	0.034	(0.0242)
Hukou	-0.196***	(0.0269)
Constant	10.892***	(0.0692)
<hr/>		
Region Controls	Yes	
Observations	10,814	
R-squared	0.358	
F-statistic	365.62	

Note: robust standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10%, respectively.

Source: Author's calculations

#### 4.4.2 The Impact of the Various Components of Financial Inclusion on Household Welfare

The causal impact of financial inclusion on household welfare lacks empirical justification in past studies and the impact of financial inclusion may vary between different financial products and services. Therefore, to answer the research question of which aspects of financial inclusion are most important in improving household welfare, we decompose the measure of financial inclusion into the use of savings accounts, mobile payment accounts, credit cards, and commercial insurance to explore the welfare effect individually. The same specification of equation (3.9) (see Chapter 3) is used for each component. Table 4.7 presents the results using the same dependent variable of (log) total annual household consumption expenditure.

Table 4.7 The Impact of Financial Inclusion by Category

Variables	Dependent variable: (log) household annual consumption			
	(1)	(2)	(3)	(4)
Savings_account	0.078*** (0.0193)			
Mobile_account		0.345*** (0.0172)		
Credit_card			0.292*** (0.0314)	
Commercial_insurance				0.224*** (0.0216)
Age	-0.015*** (0.0007)	-0.010*** (0.0008)	-0.014*** (0.0007)	-0.014*** (0.0007)
Gender	-0.039* (0.0206)	-0.043** (0.0202)	-0.038* (0.0205)	-0.036* (0.0205)
Family size	0.197*** (0.0051)	0.180*** (0.0050)	0.194*** (0.0050)	0.193*** (0.0051)
Farmer	-0.100*** (0.0196)	-0.084*** (0.0193)	-0.094*** (0.0195)	-0.098*** (0.0196)
Temporary worker	0.002 (0.0260)	-0.006 (0.0254)	0.009 (0.0257)	0.006 (0.0258)
Employee	0.164*** (0.0351)	0.122*** (0.0347)	0.155*** (0.0352)	0.160*** (0.0351)
Self-employed	0.352*** (0.0377)	0.278*** (0.0369)	0.336*** (0.0374)	0.341*** (0.0372)
Junior high education	0.103*** (0.0156)	0.077*** (0.0153)	0.102*** (0.0155)	0.095*** (0.0155)
Senior high education	0.212*** (0.0225)	0.167*** (0.0222)	0.201*** (0.0224)	0.200*** (0.0225)
Tertiary education	0.390*** (0.0606)	0.314*** (0.0590)	0.349*** (0.0596)	0.362*** (0.0595)
Marriage	0.227*** (0.0226)	0.241*** (0.0223)	0.232*** (0.0226)	0.229*** (0.0226)
Ethnicity	0.052** (0.0244)	0.037 (0.0240)	0.054** (0.0243)	0.046* (0.0243)
Hukou	-0.205*** (0.0273)	-0.188*** (0.0269)	-0.201*** (0.0274)	-0.205*** (0.0271)
Constant	10.686*** (0.0688)	10.336*** (0.0693)	10.634*** (0.0687)	10.651*** (0.0684)
Region Controls	Yes	Yes	Yes	Yes
Observations	10,814	10,814	10,814	10,814
R-squared	0.346	0.369	0.351	0.351
F-statistic	338.48	385.59	346.07	349.66

Note: robust standard errors in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10%, respectively.

Source: Author's calculation

As expected, Columns (1) to (4) in Table 4.6 reveal that financial inclusion represented by the use of various banking services has a significant impact on explaining the household welfare at the one percent level, but with varying magnitudes. Specifically, the welfare effect of the use of mobile payment accounts has the greatest impact on household welfare, at about 35 percent, whereas the use of savings accounts has a relatively low effect (about eight percent) on household welfare. The coefficient estimates reflect that households that are financially included measured by mobile payment account use have 35 percent more annual consumption expenditure than those without the use of any digital payment account. Based on the coefficients across each column in Table 4.7, households with the use of formal savings, credit cards, and commercial insurance can increase their household welfare by 7.8 percent, 29.2 percent, and 22.4 percent, respectively.

Overall, the empirical results shed light on whether being financially included can improve households' living standards. The findings reveal that financial inclusion measured by an array of banking services (i.e., use of savings account, mobile payment account, credit card, and commercial insurance) has a sizable positive effect on household consumption expenditure. This implies that the welfare impact of financial inclusion is not sensitive to how financial inclusion is proxied. We confirm the theoretical framework by our empirical findings suggesting that financial inclusion is both statistically significant and economically meaningful in explaining the impact of household welfare. The impact of financial inclusion could raise household living standards through the four transmission channels. First, improving access to savings, which fosters households' propensity to accumulate savings and have opportunities to make investments and boost consumption. Second, allowing households to access various financial services through mobile banking ranging from payment transactions to an array of digital financial services, expands ways for unbanked households to access formal financial services. Third, facilitating formal borrowings that encourage households to access credit. Fourth, providing commercial insurance as a layer of protection for households to improve their resilience against systemic risks.

#### **4.4.3 Robustness Check 1: The Test of Using an Alternative Cut-Off Point**

In the main estimation, the binary variable financial exclusion is computed using the financial deprivation score based on the use of four banking services with a threshold of 0.5 points. We therefore examine the robustness of our results by using an alternative cut-off point as a final check. Table 4.8 provides the OLS results re-estimated by using 0.75 as the cut-off point to measure financial deprivation. This means a household is classified as financially excluded only if its deprivation score is higher than 0.75. In other words, a household is financially excluded if the household uses only one of the four measures of financial inclusion. Based on the empirical results in Table 4.8, financial exclusion has a significant negative impact on household welfare in terms of

household total consumption expenditure. The coefficient estimate is -0.277, implying financially included households (using more than one of the four banking services) improve household welfare by 27.7 percent more than those financially deprived. Therefore, the estimation results show a significant impact of financial inclusion on household welfare and corroborate the baseline results with 0.5 as the cut-off point, which further supports our measure of financial inclusion.

Table 4.8 Financial Inclusion and Household Welfare (at 0.75 Cut-off Point)

Variable	Dependent variable: (log) household annual consumption	
	Coefficient	Robust S.E.
FE (Financial Exclusion)	-0.277***	(0.0153)
Age	-0.012***	(0.0008)
Gender	-0.044**	(0.0202)
Family size	0.185***	(0.0050)
Farmer	-0.098***	(0.0193)
Temporary worker	-0.010	(0.0255)
Employee	0.127***	(0.0347)
Self-employed	0.292***	(0.0373)
Junior high education	0.073***	(0.0154)
Senior high education	0.175***	(0.0223)
Tertiary education	0.336***	(0.0599)
Marriage	0.224***	(0.0223)
Ethnicity	0.040**	(0.0240)
Hukou	-0.187***	(0.0269)
Constant	10.716***	(0.0674)
Region Controls	Yes	
Observations	10,814	
R-squared	0.365	
F-statistic	374.83	

Note: robust standard errors in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10%, respectively.

Source: Author's calculations

#### 4.4.4 Robustness Check 2: Propensity Score Matching

In this section, following the study by Caliendo and Kopeinig (2008), we use propensity score matching (PSM) to account for potential endogeneity and selectivity bias issues by multiple matching methods, including nearest-neighbour, radius, kernel, and a local linear regression is conducted. The results are summarized in Table 4.10. In PSM, it is important to test the balance of covariates. Based on the approach suggested by Staffa and Zurakowski (2018), we assess the quality of matching based on the mean standard bias instead of using p-value since it is highly driven by sample size. An absolute standardized mean bias greater than 10 percent represents a meaningful imbalance. Table

4.9 and Figure 4.1 show the sensitivity test to diagnose balancing quality reveals that all the variables in our PSM have a good balance with regard to standard bias.

Table 4.9 Test of Covariate Balance (Propensity Score Matching)

Variable	Unmatched		Mean		%bias	% reduct  bias
	Matched	Treated	Control			
Age	U	60.741	51.805	84.6		
	M	60.167	60.406	-2.3	97.3	
Gender	U	0.84212	0.89721	-16.4		
	M	0.84906	0.87858	-8.8	46.4	
Family size	U	3.0348	3.9125	-56.1		
	M	3.0827	3.2076	-8.0	85.8	
Farmer	U	0.57587	0.41114	33.4		
	M	0.58312	0.58697	-0.8	97.7	
Temporary worker	U	0.12876	0.21552	-23.1		
	M	0.13243	0.12783	1.2	94.7	
Employee	U	0.04368	0.14257	-34.5		
	M	0.04493	0.05081	-2.1	94.1	
Self-employed	U	0.03827	0.12997	-33.5		
	M	0.03937	0.03958	-0.1	99.8	
Junior high education	U	0.33916	0.51525	-36.2		
	M	0.34863	0.33472	2.9	92.1	
Senior high education	U	0.09787	0.19164	-26.9		
	M	0.10066	0.09745	0.9	96.6	
Tertiary education	U	0.00905	0.04443	-22.1		
	M	0.00931	0.01177	-1.5	93.0	
Marriage	U	0.85772	0.94098	-27.9		
	M	0.87334	0.85088	7.5	73.0	
Ethnicity	U	0.88757	0.92573	-13.1		
	M	0.8942	0.89656	-0.8	93.8	
Hukou	U	0.93406	0.89456	14.1		
	M	0.93282	0.93699	-1.5	89.4	

Source: Author's calculations

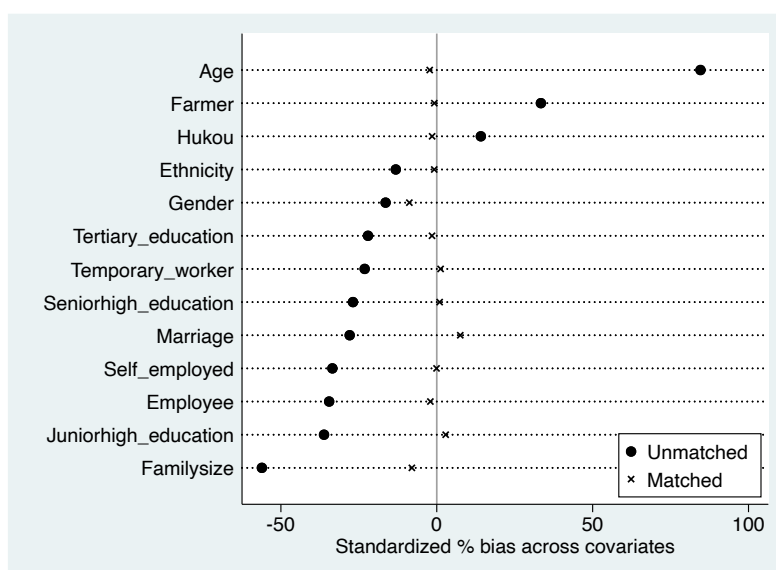


Figure 4.1 Standardized Bias Before and After Propensity Score Matching

Source: Author's calculation

The PSM results in Table 4.10 suggest that, overall, the household living standard is lower for households that are financially deprived. All the corresponding coefficients of average treatment effect on the treated (ATT) are consistent and close to the baseline results ranging from -0.306 to -0.460, with the same significance level of one percent. For instance, the ATT of the nearest-neighbour matching algorithm is -0.306, suggesting that household annual consumption expenditure is approximately 31 percent lower for a household that is financially deprived compared with a financially included household. The kernel matching algorithm gives the largest ATT of -0.460, indicating that household consumption expenditure of financially excluded households will be 46 percent lower than that of financially included counterparts. It is notable that all PSM coefficients are relatively higher than our OLS baseline results, meaning downward bias in the OLS estimates.

However, all coefficients are similar to our baseline results indicating financial inclusion has a considerable impact on household consumption expenditure. Hence, we can conclude that our findings on the effect of financial inclusion on household welfare are valid and robust to deal with potential endogeneity and self-selectivity bias issue.

Table 4.10 Propensity Score Matching Results with Different Matching Methods

PSM estimations with different matching methods	ATT (average treatment effect on the treated)	
	Observed coefficient	Standard error
1-Nearest-neighbour (one-to-one)	-0.306***	0.0446
4-Nearest-neighbour	-0.352***	0.0440
Radius	-0.386***	0.0393
Kernel	-0.460***	0.0305
Local linear regression	-0.441***	0.0389
<b>Baseline result</b>		
OLS	-0.305***	0.0203

Note: bootstrap standard errors with 100 replications. \*\*\* represent significance at 1 percent level  
Source: Author's calculations

## 4.5 Chapter Summary

Using the new nationally representative CHFS 2019 data, this chapter presents a detailed analysis of financial inclusion status in rural China in 2019 and examines the relevant determinants and welfare impact of financial inclusion at the rural household level. To identify the relevant factors for various banking service uses, we select a range of financial inclusion indicators that take into account whether rural households have saving accounts, mobile payment accounts, credit cards, and commercial insurance. On average, rural households living in eastern provinces have a relatively higher level of financial inclusion than those in the central region. However, rural households, on average, have minimal proportionate use of the different types of financial services.

To explore the determinants of financial inclusion, a probit estimation of the financial inclusion use dimension is used. The empirical findings suggest that income level, family size, household head's

education level, financial literacy, and employment status are statistically significant indicators of financial inclusion of China's rural households. In addition, the influence of financial inclusion on household living standards is examined using the OLS technique. The results reveal that being financially included has a significant positive impact on household welfare measured by household annual consumption expenditure. The results are strongly established in both composite and single measures of financial inclusion.

# Chapter 5

## Conclusions

This chapter summarises the study. Section 5.1 reviews the key findings. Policy implications are presented in Section 5.2 based on the empirical results. Section 5.3 outlines the study's research limitation as a basis for future research recommendations.

### 5.1 Major Findings

This study is motivated by the existing research gap of a lack of detailed studies on financial inclusion in rural China, where financial deprivation is most prevalent. This study endeavours to measure the level of financial inclusion in rural China, focusing on household level indicators and exploring the related determinants. The research data are from the nationally representative household-level data CHFS 2019, which provides robust, informative findings. This study contributes to the scant empirical literature on rural China and its transition mechanism. To the best of our knowledge, no detailed research on China's rural households has been performed nor has any research established the transmission mechanism in rural China. The overall empirical findings can be summarized as follows.

Because of the complexity of defining and measuring financial inclusion, we consider both aggregate and individual indicators to investigate the level of financial inclusion in rural China. The entropy method is used to assign weights and construct the final composite financial inclusion index. The core component of financial inclusion, usage, is measured separately based on four common banking services: the use of a savings account, mobile payment account, credit card, and commercial insurance. These reflect the use of both traditional and non-traditional banking services in China. Compared with prior studies, one contribution of this study is that we select mobile bank account use as one indicator to consider the importance of deepening technology in the context of China's rural households. Based on the financial inclusion index, rural households are more inclined to use mobile payment accounts. This highlights that current ICT deepening plays a critical role in enhancing financial inclusion. Only a minimal percentage of rural households reported using credit cards. Regional disparity is significant in rural China; people living in the eastern region have the highest level of financial inclusion in both aggregate and single measures, and the central region has the lowest.

Even though China has been emphasizing the importance of financial inclusion and expanding access to financial services for individuals, the composite index shows insufficient banking services' use. The results underscore the importance of analysing the determinants of participating in the formal financial system in rural China. Thus, this study focuses on household characteristics to identify

attributes that influence financial decisions among rural households. A probit model specification is adopted in this study covering four indicators of banking service use. Overall, the findings reveal that the likelihood of choosing to be financially included increases if the household head has better income, education, financial literacy, and employment status.

The question whether being financially included can truly lift households' living standards is also investigated in this study. The aim is to understand the impact of financial inclusion supported by empirical evidence at household level. We establish the nexus between financial inclusion and welfare using rural households to understand the trajectory of how financial inclusion can lead to economic inclusion at the micro-level. Based on the results, participating in the formal financial system has an unambiguous effect on household welfare proxied by household consumption expenditure, which means bringing the underprivileged sections under the scope of banking services can help them improve their living standards. The result is solid to alternative measures of financial inclusion. All four financial inclusion indicators independently impact household welfare with varying magnitudes. The possible ways through the four channels of financial inclusion that conduit into economic inclusion can be explained by financial inclusion, which can help households accumulate savings, smooth their consumption, invest in businesses, education, and healthcare and improve resilience to external shocks without liquidating durable assets.

## **5.2 Policy Implications**

This study provides several policy implications that could help Chinese governments understand the inherent factors and constraints on the progress of achieving inclusive finance. First, we demonstrate a comprehensive measure of financial inclusion from both demand and supply perspectives in rural China. This will assist policymakers in designing holistic policies to remove hurdles by effective government intervention in rural China. Although substantial progress has been achieved, there is a long way to go to get rural households financially included to achieve an inclusive financial system. Therefore, achieving inclusive finance in China should focus on less developed areas. It is necessary to let rural households, especially poor, disadvantaged groups, get involved in the financial system since they are normally neglected by the financial market. Without basic access and use of formal banking services, underprivileged segments will still lag behind in China's economy.

Second, regarding the importance of bank branch density in explaining financial inclusion, the Chinese government should facilitate financial inclusion programmes by designing a favourable regulatory framework for microfinance institutions and banks to enter rural areas. This is because the outreach of banking services represents the availability and convenience for people carrying out financial activities. For example, to encourage the rural households to use mobile money, the government must invest heavily in marketing to customers, acquiring and training agents, and

investing in business and distribution infrastructure. In addition, the proliferation of mobile phone use, which provides amenities to these hitherto excluded households, will lower the thresholds to using formal financial services and enhance operating efficiency for financial institutions.

Governments should continuously build Information and Communications Technology infrastructure and expand banking delivery channels to reach out to underserved and unbanked areas through financial innovation and mobile banking to increase accessibility to banking services by the populace. However, cyber security and network disruption need special attention to provide a reliable, safe internet banking environment.

Third, the use of credit cards by households is relatively low in rural China. The choice of using financial services can be significantly influenced by different household socioeconomic circumstances, such as household size, education level, financial literacy, income level and employment status. Therefore, government policies should be in line with household characteristics to effectively improve the level of financial inclusion. The empirical results suggest that improving financial literacy is an effective way to increase financial capabilities and the awareness of financial products and services among rural households, thereby influencing participation in formal finance, such as encouraging rural households to use savings, formal borrowing, and insurance through a financial education campaign and financial knowledge training. In addition, an efficient, inclusive financial system lays a strong foundation for financial development and economic growth at the macro-level. With regard to the negative impact of financial exclusion on household welfare at the micro-level, efficient measures should be put in place to ensure ease of access to and use of various banking services to truly improve the quality of people's lives and household welfare. Corresponding policies should be aligned to the transmission channels of financial inclusion rather than relying on recommendations without empirical evidence.

### **5.3 Limitations of the Study and Suggestions for Future Research**

The first limitation of this study is the financial inclusion indicators used from the dataset. Although we select multiple variables to reflect the various component of financial inclusion, we did not capture the quality of financial services as an integral part of financial inclusion because of a lack of relevant data. Future research could include the quality of banking services to better elucidate financial inclusion levels. The quality dimension includes indicators such as customer satisfaction, affordability, convenience and transparency of financial products. These indicators could provide guidance for policy makers on customers' perceptions and attitudes towards the financial services and products they receive, which can be used to reflect the underlying financial market environment, thereby designing appropriate policies and monitoring financial inclusion progress over time.

Another limitation of this study is that the CHFS2019 dataset allows us to explore determinants of financial inclusion only based on household characteristics from the demand perspective. Future studies should focus on supply side information, such as specific financial inclusion barriers, including discrimination, cost, documentation, and other constraints. For instance, the empirical results suggest that rural households have low use of credit. This may indicate that credit service is highly inaccessible to some rural households. Since access to credit is a key indicator of financial development, current research on credit constraints is relatively scant. This credit constraint topic is worth further study to better elucidate the level of financial inclusion in China and help individual access to formal credit services without discrimination and constraints on their use. The factors affecting the choice of different financial services, i.e., formal and informal markets, should be further investigated. This is because households participating in the informal financial markets tend to suffer more financial exclusion. We examined only the welfare channels of financial inclusion based on household consumption expenditure, other potential measures of household welfare such as consumption diversification and human wellbeing index could be investigated in subsequent studies based on the relevant literature.

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## Appendix A

### Tables

#### A.1 The Descriptive Statistics of the Variables

Variable	Obs	Mean	Std. Dev.	Min	Max	Description
<b>Financial inclusion variables</b>						
FE (Financial exclusion)	12,022	0.857	0.350	0	1	Binary: a measure of households' level of financial exclusion equal to 1 if a household is financially excluded (deprivation score of financial inclusion is above 0.5), 0 otherwise
Financial deprivation score	12,022	0.842	0.204	0	1	Household financial deprivation score (0-1)
Saving account	12,022	0.119	0.323	0	1	Binary: equal to 1 if the household has a savings account, 0 otherwise
Mobile payment account	12,022	0.339	0.473	0	1	Binary: equal to 1 if the household has a mobile payment account, 0 otherwise
Credit card	12,022	0.062	0.240	0	1	Binary: equal to 1 if the household has a credit card, 0 otherwise
Commercial insurance	12,022	0.113	0.317	0	1	Binary: equal to 1 if the household has commercial insurance, 0 otherwise
<b>Household head's characteristics</b>						
Age	12,019	59.128	11.800	17	102	Continuous: household head's age
Age <sup>2</sup>	12,019	3,635.315	1,395.421	289	10,404	Continuous: household head's age squared
Gender	12,022	0.848	0.359	0	1	Binary: equal to 1 if the household head is male, 0 otherwise
Marriage	12,018	0.863	0.344	0	1	Binary: equal to 1 if the household head is married, 0 otherwise
Ethnicity	11,159	0.893	0.310	0	1	Binary: equal to 1 if the household head is Han Chinese, 0 otherwise
Hukou	12,008	0.928	0.259	0	1	Binary: equal to 1 if the household head has an agricultural residence permit (Hukou), 0 otherwise
Farmer	12,002	0.540	0.498	0	1	Binary: equal to 1 if the household head is engaged in farming, 0 otherwise

Temporary worker	12,002	0.147	0.354	0	1	Binary: equal to 1 if the household head is employed as temporary worker, 0 otherwise
Employee	12,002	0.060	0.237	0	1	Binary: equal to 1 if the household head is employed by someone or some units, 0 otherwise
Self-employed	12,002	0.053	0.223	0	1	Binary: equal to 1 if the household head is self-employed, 0 otherwise
Unemployed	12,002	0.200	0.400	0	1	Binary: equal to 1 if the household head is unemployed, 0 otherwise
Basic education	12,011	0.513	0.500	0	1	Binary: equal to 1 if the household head's highest education level is primary school, 0 otherwise
Junior high education	12,011	0.363	0.481	0	1	Binary: equal to 1 if the household head's highest education level is junior high school, 0 otherwise
Secondary high education	12,011	0.109	0.312	0	1	Binary: equal to 1 if the household head's highest education level is secondary high school, 0 otherwise
Tertiary education	12,011	0.015	0.120	0	1	Binary: equal to 1 if the household head's highest education level is tertiary education, 0 otherwise
Communist Party	11,432	0.128	0.334	0	1	Binary: equal to 1 if the household head's political status is communist party, 0 otherwise
Financial literacy	11,761	0.286	0.452	0	1	Binary: equal to 1 if the household head has financial knowledge, 0 otherwise
<b>Household's demographic characteristics</b>						
Family size	12,022	3.268	1.683	1	12	Continuous: number of family members in the household
Household total consumption (log)	12,022	10.453	0.872	7.212	14.663	Continuous: natural logarithm of household total annual consumption
Income_Q1	11,188	0.210	0.408	0	1	Binary: equal to 1 if the household belongs to the first income quintile (the poorest), 0 otherwise
Income_Q2	11,188	0.192	0.394	0	1	Binary: equal to 1 if the household belongs to the second income quintile, 0 otherwise
Income_Q3	11,188	0.215	0.411	0	1	Binary: equal to 1 if the household belongs to the third income quintile, 0 otherwise

Income_Q4	11,188	0.185	0.389	0	1	Binary: equal to 1 if the household belongs to the fourth income quintile, 0 otherwise
Income_Q5	11,188	0.197	0.398	0	1	Binary: equal to 1 if the household belongs to the fifth income quintile (the richest), 0 otherwise
Region	11,685	1.981	0.815	1	3	Categorical: equal to 1 if the household locates in eastern provinces, 2 = central provinces, 3 = western provinces

**Note:** Unemployed, Basic education, and Income\_Q5 are omitted variables in the empirical models.

Source: Author's Calculation

## A.2 The Correlation Matrix for Empirical Model (I)

	Age	Gender	Family size	Farmer	Temporary worker	Employee	Self-employed	Junior high education	Senior high education	Tertiary education	Income_Q 1	Income_Q 2	Income_Q 3	Income_Q 4	Financial literacy	Communist party
Age	1															
Gender	-0.060***	1														
Family size	-0.402***	0.129***	1													
Farmers	0.041***	0.028**	-0.009	1												
Temporary worker	-0.228***	0.085***	0.092***	-0.456***	1											
Employee	-0.155***	0.049***	0.058***	-0.279***	-0.104***	1										
Self-employed	-0.141***	0.041***	0.065***	-0.259***	-0.097***	-0.059***	1									
Junior high education	-0.209***	0.128***	0.093***	-0.009	0.070***	0.032**	0.065***	1								
Senior high education	-0.053***	0.071***	0.036***	-0.074***	0.033***	0.132***	0.043***	-0.271***	1							
Tertiary education	-0.113***	0.015	0.054***	-0.087***	-0.005	0.191***	0.031**	-0.090***	-0.042***	1						
Income_Q1	0.298***	-0.119***	-0.269***	0.068***	-0.159***	-0.112***	-0.084***	-0.131***	-0.097***	-0.056***	1					
Income_Q2	0.126***	0.014	-0.143***	0.094***	-0.067***	-0.070***	-0.057***	-0.059***	-0.042***	-0.046***	-0.254***	1				
Income_Q3	-0.053***	0.039***	0.005	0.039***	0.040***	-0.025**	-0.032***	0.037***	0.006	-0.036***	-0.271***	-0.256***	1			
Income_Q4	-0.137***	0.023*	0.127***	-0.060***	0.100***	0.030**	0.016	0.054***	0.020*	0.006	-0.248***	-0.234***	-0.250***	1		
Financial literacy	-0.163***	0.056***	0.101***	-0.064***	0.024*	0.111***	0.088***	0.114***	0.118***	0.103***	-0.170***	-0.070***	-0.012	0.054***	1	
Communist party	0.065***	0.097***	0.014	-0.074***	-0.007	0.149***	-0.011	0.025*	0.170***	0.124***	-0.069***	-0.029**	0.001	0.023*	0.082***	1

p<0.05, \*\* p<0.01, \*\*\* p<0.001

Source: Author's calculations

\*

### A.3 The Correlation Matrix for Empirical Model (II)

	Savings	Mobile account	Credit card	Commercial insurance	Financial exclusion	Age	Gender	Family size	Farmer	Temporary worker	Employee	Self-employed	Junior high education	Senior high education	Tertiary education	Marriage	Ethnicity	Hukou	Region	
Savings	1																			
Mobile account	0.089***	1																		
Credit card	0.037***	0.225***	1																	
Commercial insurance	0.094***	0.198***	0.139***	1																
Financial exclusion	-0.408***	-0.509***	-0.485***	-0.548***	1															
Age	0.006	-0.487***	-0.165***	-0.165***	0.269***	1														
Gender	0.041***	0.082***	0.023*	0.0315**	-0.053***	-0.061***	1													
Family size	-0.007	0.338***	0.114***	0.142***	-0.188***	-0.414***	0.145***	1												
Farmer	-0.021*	-0.138***	-0.076**	-0.040***	0.115***	0.039***	0.041***	0.004	1											
Temporary worker	0.032***	0.139***	0.022*	0.034***	-0.084***	-0.230***	0.079***	0.095***	-0.452***	1										
Employee	0.043***	0.170***	0.106***	0.072***	-0.146***	-0.155***	0.050***	0.063***	-0.274***	-0.100***	1									
Self-employed	0.037***	0.194***	0.105***	0.080***	-0.148***	-0.151***	0.046***	0.063***	-0.257***	-0.094***	-0.057***	1								
Junior high education	0.076***	0.170***	0.046***	0.096***	-0.127***	-0.214***	0.134***	0.104***	-0.002	0.062***	0.035***	0.070***	1							
Senior high education	0.037***	0.114***	0.073***	0.062***	-0.102***	-0.051***	0.070***	0.034***	-0.067***	0.030**	0.127***	0.037***	-0.263***	1						
Tertiary education	0.008	0.123***	0.103***	0.065***	-0.106***	-0.115***	0.013	0.058***	-0.090***	0.001	0.201***	0.033***	-0.090***	-0.042***	1					
Marriage	0.064***	0.125***	0.042***	0.070***	-0.087***	-0.177***	0.305***	0.313***	0.085***	0.053***	0.045***	0.035***	0.131***	0.075***	0.020*	1				
Ethnicity	0.071***	-0.025*	-0.015	0.022*	-0.040***	0.157***	0.018	-0.120***	-0.032***	0.001	-0.001	0.015	0.056***	0.053***	-0.011	0.008	1			
Hukou	-0.027**	-0.057***	-0.050***	-0.023*	0.054***	0.000	-0.017	-0.015	0.094***	0.015	-0.100***	-0.012	0.013	-0.052***	-0.154***	-0.003	0.015	1		
Region	-0.081***	-0.0315**	0.005	-0.004	0.055***	-0.050***	-0.024*	0.084***	0.124***	-0.048***	-0.060***	-0.056***	-0.066***	-0.084***	-0.021*	-0.013	-0.211***	-0.016	1	

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Source: Author's calculations

#### A.4 The Variance Inflation Factors of the Explanatory Variables in Empirical Model (I)

Variable	VIF	1/VIF
Age2	66.87	0.014955
Age	65.86	0.015187
Income_Q1	2.28	0.439031
Farmer	1.97	0.506655
Income_Q2	1.97	0.508065
Income_Q3	1.84	0.542676
Temporary worker	1.83	0.54791
Income_Q4	1.67	0.60017
Employee	1.47	0.68201
Self-employed	1.36	0.737616
Family size	1.32	0.755678
Junior high education	1.25	0.801898
Senior high education	1.23	0.812739
Tertiary education	1.12	0.893195
Financial literacy	1.11	0.903788
Communist party	1.10	0.908596
Gender	1.08	0.925159
<b>Mean VIF</b>	<b>9.14</b>	

Source: Author's Calculation

## A.5 The Variance Inflation Factors of the Explanatory Variables in Empirical Model (II)

<b>Variable</b>	<b>VIF</b>	<b>1/VIF</b>
Farmer	1.90	0.526025
Temporary worker	1.75	0.571338
Age	1.52	0.659804
Employee	1.41	0.711628
Self-employed	1.32	0.756681
Family size	1.32	0.758372
Marriage	1.23	0.810477
Junior high education	1.23	0.814222
Senior high education	1.16	0.858376
Gender	1.15	0.870722
Tertiary education	1.11	0.903311
Ethnicity	1.09	0.917807
Region	1.08	0.922221
Hukou	1.04	0.959469
<b>Mean VIF</b>	<b>1.31</b>	

Source: Author's calculations