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IMPACTS OF FINANCIAL LITERACY ON THE LOAN DECISIONS OF FINANCIALLY EXCLUDED HOUSEHOLDS IN THE PEOPLE'S REPUBLIC OF CHINA

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Abstract

Government leaders around the world are designing national strategies to improve financial inclusion for populations traditionally excluded from the financial markets. Financial literacy is a key tool being used to bring economically vulnerable populations into the financial mainstream. Data from the *2013 China Household Finance Survey (CHFS)* were used to investigate the impacts of various dimensions of financial literacy on the usage of bank and non-bank loans among rural, illiterate, and migrant populations in the People's Republic of China. The findings show that the most vulnerable groups may be less likely to benefit from financial literacy, especially when it comes to usage of formal bank loans. Other factors such as those related to social networks and infrastructure may matter more than financial literacy. Results were found to vary across measures of financial literacy and financial inclusion. The findings suggest that barriers to access likely need to be overcome so that financial literacy can be more effective. The current study provides important insights for policy makers and international organizations designing national strategies to improve financial inclusion via financial literacy, especially for populations that have been traditionally excluded. Researchers are encouraged to reexamine previous definitions and measures of financial literacy and inclusion to develop a better understanding of the relationship between the two dimensions.

Keywords: financial literacy, financial inclusion, loan usage, financially vulnerable populations, People's Republic of China

JEL Classification: D12, D14, G21, G23, G41, O17

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1. INTRODUCTION

Financial inclusion refers to the delivery of affordable and safe financial services that meet the financial needs of disadvantaged and low-income segments of society that have been excluded from the formal financial markets. Policy makers and researchers worldwide have argued that inaccessibility to formal financial services, especially credit, can have a dampening effect on economic growth, which can result in financial instability and economic inequalities at the household and national levels (Beck, Demirgüç-Kunt, and Levine, 2007; Čihák, Mare, and Melecký, 2016; Dabla-Norris et al., 2015; Demirgüç-Kunt and Levine, 2009; Han and Melecky, 2013; Hannig and Jansen, 2010; Lyons, Grable, and Zeng, 2017; Park and Mercado, 2015; Sahay et al., 2015; United Nations, 2015). Therefore, it is not surprising that many countries now have national financial inclusion agendas and strategies aimed at reducing economic and financial disparities, especially for groups that have been traditionally excluded from the formal financial sector (Basel Committee on Banking Supervision, 2015; G20 Financial Inclusion Experts Group ATISG Report, 2010; G20 Global Partnership for Financial Inclusion, 2016, 2017; Mehrotra and Yetman, 2015; United Nations, 2015; The World Bank, 2014, 2018).

Many studies have defined financial inclusion in terms of access, usage, and quality of formal financial services (Allen et al., 2016; Demirgüç-Kunt and Klapper, 2013; Demirgüç-Kunt et al., 2014; Lyons, Grable, and Zeng, 2017; The World Bank, n.d.). These studies primarily focus on examining the asset side of households' financial portfolios, and in particular, access to and usage of bank deposit accounts. While account access is fundamental, researchers acknowledge that financial inclusion needs to be more broadly defined, especially given heterogeneity both across and within developing economies. Definitions of financial inclusion now include a wide range of products and services related to non-bank savings, investments, credit, insurance, and electronic payment and transfer services in both the formal and informal sectors (e.g., Asian Development Bank, 2016, 2017; Davutyan and Öztürkkal, 2016; Demirgüç-Kunt, Klapper, and Singer, 2017; Lyons, 2018; Lyons, Grable, and Joo, 2018; Lyons and Kass-Hanna, forthcoming; Mehrotra and Yetman, 2015; Villasenor, West, and Lewis, 2015, 2016; United Nations, 2015; The World Bank, 2014, 2018).

What does it mean to be "financially included" in the People's Republic of China (PRC)? As a developing economy, the PRC poses an interesting case when it comes to financial inclusion. On the surface, the PRC appears to already have high levels of financial inclusion when it comes to households' access to and usage of formal deposit accounts (Cai et al., 2012; Duflos, 2015; Lyons, Song, and Wu, forthcoming; The World Bank, 2018). This includes active engagement in formal savings practices and usage of digital financial services. Therefore, one might conclude that financial inclusion is not a major problem in the PRC (Fungáčová and Weill, 2015). However, the PRC's formal credit markets have not kept pace with economic growth and have remained largely underdeveloped (Chen and Jin, 2017; Sparreboom and Duflos, 2012). Formal credit in the PRC is still mainly directed towards large state-owned enterprises and rarely targets the credit needs of individuals (Chen and Jin, 2016). A large portion of Chinese households continue to be limited in access to and usage of formal credit, especially in rural and poor urban areas. Many still rely heavily on informal credit from alternative sources, such as family and friends, to meet their borrowing needs (Fungáčová and Weill, 2015).

Limited access to formal bank credit may not have been much of a concern a few years ago. However, a slowing economy and widening income inequality have led the PRC's central government to turn to financial inclusion as a key policy tool to reduce socioeconomic inequalities and foster more economic growth and development.[1] In 2015, the central government formalized a national strategy to improve accessibility of financial services (and in particular, access to credit) to socially and economically disadvantaged populations (State Council, 2015). This was later followed by a plan in 2016 to eliminate poverty in rural areas by 2020 (China's Plan, 2018).

Three populations have been identified in the PRC as being particularly at risk for financial exclusion and are therefore being targeted by these national efforts: rural, illiterate, and migrant populations (Cai et al., 2012; Duflos, 2015; Fungáčová and Weill, 2015; Li, Gan, and Hu, 2011; Li et al., 2010; Lu and Xia, 2016; Peng, Zhao, and Wang, 2014; Sun and Huang, 2010; The World Bank, 2018). This includes small farmers in the rural areas and owners of micro and small enterprises in the urban areas (Lyons, Grable, and Zeng, 2017; The World Bank, 2018). The People's Bank of China (the PRC's central bank) in cooperation with the state-owned banks and rural credit cooperatives (RCCs) have been primarily responsible for leading these efforts (Asian Development Bank Institute, 2014; Duwal and Sun, 2013; Kumar, Narain, and Rubbani, 2015; Park and Mercado, 2015; Sparreboom and Duflos, 2012). From a policy perspective, improving access to credit to financially disadvantaged groups is viewed as critical to the PRC's long-term economic agenda of poverty reduction, growth, and financial stability. Access to credit, especially formal credit, provides the mechanism by which individuals in poorer sections of society are able to participate in their community and country's economic growth while also being able to access the necessary resources to establish their own longer-term financial security (e.g., purchase a home, start a business, obtain an education) (Mehrotra and Yetman, 2015; The World Bank, 2018).

Financial literacy interventions are a key policy tool currently being used to bring the PRC's most economically vulnerable populations into the financial mainstream (Asian Development Bank, 2016, 2017; Klapper and Singer, 2014; Lyons, Grable, and Zeng, 2017; Lyons, Grable, and Joo, 2018; United Nations, 2015; Villasenor, West, and Lewis, 2016; The World Bank, 2014, 2018; Yuan and Jin, 2017). However, very little is still known as to their effectiveness. And yet, almost all national agendas on financial inclusion now include some component of financial literacy (OECD/INFE, 2015; The World Bank, 2018). The argument is that groups traditionally unserved and underserved by formal financial services need to be taught how to access and use these services and protect themselves from abusive practices within the financial industry, especially when it comes to credit. However, it is difficult to empirically make the case that financial education, by itself, changes a household's financial behavior or outcomes (Lyons, Chang, and Scherpf, 2006; Lyons and Scherpf, 2004). Other forces are needed to create the appropriate environment for financial knowledge to be practiced and applied. Moreover, it is often difficult for households to apply financial knowledge if they are faced with limited social support systems (Lyons, Grable, and Zeng, 2017; Lyons, Grable, and Joo, 2018).[2] There are also preexisting barriers that can limit the impact of financial knowledge, perhaps due to poor infrastructure and

[1] The Gini coefficient for income inequality in the People's Republic of China was estimated to have nearly doubled from 0.30 to 0.55 between 1995 and 2012 (Xie and Zhou, 2014).

[2] A household's social support system refers to its social, peer, familial, and community networks that provide a type of social insurance or social capital that can be used by the household when deciding whether to participate in the formal financial markets (Bongomin et al., 2017; Li et al., 2010; Sun and Huang, 2010).

limited technologies (Asian Development Bank, 2017; Lyons, Grable, and Zeng, 2017; The World Bank, 2018).[3] It is important that all of these factors (financial literacy, social capital, and infrastructure and technology) be taken into consideration when designing and implementing national financial inclusion agendas (Lyons, Grable, and Zeng, 2017; Sahay et al., 2015; The World Bank, 2014, 2018).

This paper focuses on examining the effects of financial literacy on financial inclusion in the PRC while also controlling for social, infrastructure, and technology factors rarely accounted for in previous studies. It is among the first to specifically use household-level data from the *2013 China Household Finance Survey (CHFS)* to investigate the impacts of various dimensions of financial literacy on the usage of bank and non-bank loans among rural, illiterate, and migrant populations in the PRC. This study shows that the most vulnerable groups may be less likely to benefit from financial literacy interventions, especially when it comes to usage of formal bank loans. Moreover, other dimensions such as those related to social networks and infrastructure may matter more than financial literacy. The findings suggest that some populations may first need to overcome barriers to access before increased financial literacy can be truly effective.

This work has important implications for government leaders and international organizations that are using (or considering using) financial literacy as a means to improve financial inclusion. Like the PRC, many countries now have financial literacy programs and initiatives built into their national agendas. These programs can be time and resource intensive, especially for countries in the developing world. The international research community needs to know whether financial literacy interventions are, in fact, a viable mechanism for improving financial inclusion, especially for populations traditionally excluded from the financial markets.

The remainder of this paper is structured as follows. The next section presents an overview of the literature and the key contributions of this research. The third section describes the data and metrics used to define financial inclusion and financial literacy. The fourth section includes sample descriptive statistics and offers initial insight into the relationship between financial literacy and inclusion. The empirical framework is then presented, followed by the regression results. The final section summarizes key findings and highlights implications for the global financial inclusion community.

2. LITERATURE REVIEW

2.1 The Relationship between Financial Literacy, Inclusion, and Credit Usage

Research that investigates the links between financial literacy and financial inclusion in general is still limited, especially in terms of credit usage. For the most part, the literature on financial literacy and inclusion focuses on the relationship between financial literacy and individual financial decisions related to asset accumulation and portfolio allocation. These studies often measure financial literacy using a standard set of multiple-choice questions that test a respondent's knowledge of numeracy, interest rates, inflation, and risk diversification. The findings typically show that individuals with higher levels of "financial literacy" or "financial sophistication" are more likely to

[3] Infrastructure and technology factors refer to personal assets and community resources (such as smartphones, points of service, banking agents, cell towers, internet access, etc.), which make it possible for financial inclusion to take place (Lyons, Grable, and Zeng, 2017; OECD, 2017; Villasenor, West, and Lewis, 2016).

participate in the financial markets in general—such as having a savings plan for old age (Sekita, 2011), holding stocks (van Rooij, Lusardi, and Alessie, 2011), obtaining greater wealth accumulation (Lusardi, Michaud, and Mitchell, 2017), and having more diversified portfolios (Abreu and Mendes, 2010; Calvet, Campbell, and Sodini, 2007, 2009; von Gaudecker, 2015).

A few studies have specifically examined the relationship between financial literacy and households' borrowing decisions within the context of financial inclusion (e.g., Disney and Gathergood, 2013; Lusardi and Scheresberg, 2013; Lusardi and Tufano, 2015; Sevim, Temizel, and Sayılır, 2012). However, this research is also very limited and mostly focuses on the impact of financial literacy on high-cost borrowing in the United States and Europe. Researchers have found that those with higher levels of financial literacy are less likely to engage in high-cost borrowing and less likely to use informal financial service providers such as payday lenders (Disney and Gathergood, 2013; Lusardi and Scheresberg, 2013). Additionally, those with more financial literacy are also less likely to engage in excessive borrowing and more likely to demonstrate more informed usage of credit (Lusardi and Tufano, 2015; Sevim, Temizel, and Sayılır, 2012). The findings from these studies suggest that financial literacy is likely to be an important policy tool in the prevention of over-indebtedness. However, it is unclear as to whether it is an important factor in developing countries such as the PRC, where the goal is more often to encourage formal borrowing and reduce informal borrowing.

2.2 Financial Literacy and Inclusion in the Developing World

Studies such as those cited above are primarily based on data from the United States, Europe, or other developed countries. Very little is known about the specific relationship between financial literacy and inclusion for developing economies, although a few studies have done cross-country comparisons that include both developed and developing countries (e.g., Grohmann, Klühs, and Menkhoff, 2017; Kaiser and Menkhoff, 2016; Lyons and Kass-Hanna, forthcoming). Grohmann, Klühs, and Menkhoff (2017) found that higher levels of financial literacy were associated with better financial inclusion at the country level. The effects were largest for those countries with lower income levels, less developed financial sectors, and fewer bank branches. Other studies on developing countries have taken an experimental-design approach testing financial literacy interventions on various financial inclusion outcomes. In contrast to U.S. and European findings, these studies often have found only modest, or negligible, effects of financial literacy on key financial inclusion measures such as deposit account ownership and savings rates (e.g., Cole, Sampson, and Zia, 2011; Jamison, Karlan, and Zinman, 2014; Prina, 2015).

Kaiser and Menkhoff (2016) conducted a meta-analysis of 115 studies that examined the impacts of financial literacy interventions on a wider range of financial behaviors. While financial literacy was in general found to have a positive impact on behavior, the effects were also modest. One reason was because the impacts of financial literacy were found to be highly heterogeneous and dependent on the target group being examined (Bruhn, Ibarra, and McKenzie, 2014). Specifically, the interventions were found to be significantly less effective for low-income groups, especially those in low- and lower-middle-income economies, making it difficult to target the poor. The impacts of financial literacy were also found to be highly dependent on the type of financial behavior being targeted. In their research, Kaiser and Menkhoff found that it was more difficult to affect borrowing behavior than savings behavior with traditional financial literacy interventions. They concluded that the impact of financial literacy for a

specific target population is highly dependent on the intervention being offered at a "teachable moment."

A recent study by Lyons and Kass-Hanna (2018) took a comprehensive look at the impact of financial literacy on the financial inclusion of economically vulnerable populations in the Middle East and North Africa (MENA) (women, youth, the less educated, poor, and refugees). Financial inclusion was measured using both savings and borrowing behaviors. Individuals living in MENA countries with higher levels of financial literacy were more likely to be engaged in positive savings behaviors and more likely to be borrowing formally. They were less likely to be borrowing informally. However, economically vulnerable groups tended to be less responsive to the impacts of financial literacy than less vulnerable groups. One explanation was that these populations faced considerable barriers to financial access in the MENA region, especially in terms of formal borrowing opportunities. It was argued that these groups required more targeted and comprehensive programs to tackle the multiple barriers associated with financial inclusion, so that interventions such as financial literacy could be effective. Lyons and Kass-Hanna (2018) were also able to show that those countries with better financial and technological infrastructure, higher levels of human development, more political stability, and stronger legal rights were more likely to have higher rates of financial inclusion as well.

2.3 Financial Literacy and Inclusion in the PRC

A growing body of literature has begun to examine the impacts of financial literacy on financial inclusion outcomes in the PRC (e.g., Chu et al., 2017; Yin, Song, and Wu, 2014; Zeng et al., 2015). The focus and methodology of these studies tend to follow those cited earlier based on data from the United States and Europe. Like previous studies, this body of research typically uses household-level data to construct an index of financial literacy using financial knowledge questions related to interest, inflation, and risk diversification. Using this index, researchers then investigate the impact of financial knowledge on various investment decisions. Some also test the impact of each financial knowledge question individually. The findings for Chinese households are fairly consistent with those found for households in developed countries. Higher levels of financial knowledge, in general, tend to be associated with (1) an increase in the likelihood of financial market participation (Yin, Song, and Wu, 2014; Zhang and Yin, 2016), (2) larger shares of household assets being allocated to riskier financial assets (Chu et al., 2017; Yin, Song, and Wu, 2014; Zeng et al., 2015), (3) greater portfolio diversification (Zeng et al., 2015), and (4) greater investment returns (Chu et al., 2017; Yin, Song, and Wu, 2014).

Only a few studies have investigated the factors that determine financial inclusion in the PRC within the context of credit usage (e.g., Chen and Jin, 2017; Fungáčová and Weill, 2015; Li, Gan, and Hu, 2011). Fungáčová and Weill (2015) used data from the *2011 World Bank Global Findex* database to compare financial inclusion in the PRC with the other BRICS countries (i.e., Brazil, the Russian Federation, India, the PRC, and South Africa). While they found higher levels of financial inclusion in terms of formal account usage and savings, the usage of formal credit was significantly less frequent in the PRC relative to the other economies. Chen and Jin (2017) used data from the *2011 CHFS* to investigate the socioeconomic determinants of Chinese households' formal and informal usage of credit. This study was primarily exploratory in nature. They acknowledged that more formal research was needed to explore specific policies such as financial literacy that could be used to expand access to formal credit for socially and economically disadvantaged households. Li, Gan, and Hu (2011)

also examined the demographic determinants of accessibility of microcredit using data collected from rural households in Hubei Province. They documented the heterogeneous nature of rural households in the PRC and found that the poor and women were particularly at risk for having more limited access to formal microcredit. They pointed out that expanding microcredit programs in rural areas may not be adequate to increase credit access given the heterogeneity among rural households and their poor knowledge of existing programs. Li, Gan, and Hu (2011) acknowledged that new policies and interventions related to the development and usage of both formal and informal finance in rural areas needed to be considered. In general, the studies cited above shed light on key sociodemographic factors that may be driving credit usage in the PRC. However, they do not consider the specific role that financial literacy or other specific policy interventions may play in fostering greater usage of formal credit.

2.4 Addressing the Critical Gaps

This paper contributes to the existing literature in the following respects. First, the focus of the investigation is on the relationship between financial literacy and loan usage of Chinese households in both the formal and informal credit markets. As noted, decisions related to borrowing behaviors have been largely unexplored in the PRC and in other countries, as the focus has been primarily on saving and investment decisions. However, given that Chinese households still rely considerably on informal credit markets, it is important to consider the impacts that financial literacy may be having on this component of financial inclusion. Second, the study examines the impacts of various definitions of financial literacy on different types of loans used. As was also noted, much of the literature on financial literacy is based on either a small set of knowledge-based questions or randomized control trials where some of the target population is exposed to a financial literacy intervention. This study considers multiple measures of financial literacy and financial behavior to test the robustness of the findings, while also controlling for other social and infrastructural determinants of financial inclusion. Previous research has rarely, if at all, accounted simultaneously for these other factors. For those traditionally excluded from the financial markets, these factors may also play a critical role in mitigating barriers to entry that individuals may not have any control over. Finally, this paper is among the first to specifically focus on the impacts of financial literacy for those populations that are likely to be most vulnerable in the PRC—rural, illiterate, and migrant households. Financial literacy programs and interventions are being designed in the PRC with these types of populations in mind. Yet the research often examines the effects for the “average” individual while only controlling for sociodemographic characteristics. More research is needed to specifically investigate the effects for those at the lower end of the socioeconomic distribution. The findings from this study lay a foundation to better understand whether financial literacy is a viable mechanism for fostering inclusion and addressing issues of wealth inequality and poverty among vulnerable populations in the PRC and in other developing countries.

3. DATA AND MEASURES

Data for this study were obtained from the *2013 CHFS*. The *CHFS* is a nationally representative survey of Chinese households administered by the Survey and Research Center for China Household Finance at Southwestern University of Finance

and Economics in Chengdu, PRC.[4] The first wave of the survey was administered in 2011. The survey collected data from 8,438 households and 29,500 individuals in 80 counties and 320 communities across 25 provinces. See Gan et al. (2014) for a comprehensive overview of the original data wave. The second wave of the survey was carried out in 2013. This survey expanded the 2011 sample to enhance representativeness at the provincial level. The second wave included 28,413 households from 262 counties and 1,084 communities across 29 provinces. Additionally, the 2013 survey questionnaire included a much larger and more enriched set of questions. Detailed information was collected on Chinese households' asset and debt holdings, income and expenditures, social insurance and welfare, and a wide range of individual and household-level demographics. The survey also collected information on respondents' subjective attitudes and knowledge of finances and relationship preferences, including a subset of questions related to financial literacy, which were not included in the 2011 data.

For the purposes of this study, data from the 2013 wave were utilized.[5] A working sample of 24,047 respondents was constructed, using relevant information from the *CHFS* on financial literacy, bank and non-bank loans, social and familial networks, and community infrastructure. Observations not included in the sample were dropped due to missing information for these and other control variables (approximately 15.4% of the original sample). Below is a description of how the key variables were constructed using the data. For a summary of how all the variables were defined and constructed, see Appendix A-1.

3.1 Defining and Measuring "Financial Inclusion" in Terms of Credit Usage

This study focused on three key target populations: rural, illiterate, and migrant households. These populations have been identified in the PRC as being particularly at risk for financial exclusion. Rural households can be identified in the *CHFS* if they are currently living in a rural area or by their *"hukou"* (戶口), which is an individual's official place of residence in the government household registration system in the PRC. An individual's *hukou* can be different from someone's current place of residence. For the purposes of this study, rural households were defined according to whether a respondent was residing in a rural area at the time of the survey. Illiterate households were defined as those where a respondent never attended school or only attended primary school. Because of the recent rapid urbanization in the PRC, migrants are commonly identified using the *hukou* (Lyons, Grable, and Zeng, 2017). If a respondent

[4] The *CHFS* was modeled after the US Survey of Consumer Finances (SCF) sponsored by the US Board of Governors of the Federal Reserve System, as well as other similar US household surveys, such as the Health and Retirement Survey (Bricker et al., 2011; Bricker et al., 2012).

[5] The Survey and Research Center for China Household Finance regularly updates the *CHFS* data. The following four *CHFS* data files were used to construct the data set: (1) chfs2013_hh_20161215.dta (household-level data); (2) chfs2013_ind_20161215.dta (individual-level data); (3) chfs2013_community_20161215.dta (community-level data); and (4) chfs2013_master _20161215.dta (master-level data). Missing values for financial information were imputed internally by the center using available raw data. A review of the imputation methods indicated that some financial information may have been underreported. Even so, the values appeared to provide reasonable estimates of the financial earnings and wealth holdings of Chinese households. We used the imputed values related to household net worth and income.

had a rural *hukou* but was currently residing in a city/county that was in an urban area that did not match their rural *hukou*, the respondent was classified as a migrant.[6]

Financial inclusion was defined using information from the *CHFS* on households' usage of bank and non-bank loans for purposes related to home, business, agriculture, and/or education. With regard to formal bank loans, respondents were asked if they had a bank loan, and if so, for what purpose, from which bank, how much, and what were the terms and conditions. Respondents were also asked if a respondent had a non-bank loan and the source of the loan (i.e., parents, children, siblings, other relatives, friends/colleagues, and nongovernment financial institutions). If a respondent had a non-bank loan, the respondent was again asked more detailed questions about the loan. If a respondent reported having a home, business, agriculture, and/or educational loan, the respondent was defined as being financially included.[7]

3.2 Measuring Financial Literacy

Among researchers and policy makers, there is considerable debate about the best way to measure financial literacy (Calvet, Campbell, and Sodini, 2009; Hung, Parker, and Yoong, 2009; Lyons and Neelakantan, 2008). Traditional measures focus on testing financial knowledge using a specific battery of questions related to various economic and financial concepts. Other techniques focus on measuring participation in a "financial literacy" experience (e.g., a course, curriculum, or seminar) where knowledge is being imparted in a structured environment over a period of time. Still other approaches examine the role that information search and social networks play in acquiring financial knowledge and experience. The *CHFS* has information to capture all three dimensions of financial literacy.

The first dimension of financial literacy was constructed using the following questions, which tested respondents' knowledge about interest rates, inflation, and investment risk:

1) Given a 4% interest rate, how much would you have after 5 years if you have 100 RMB at first?
2) With an interest rate of 5% and an inflation rate of 3%, after saving money in the bank for 1 year, can you buy more or less than last year?
3) Do you think stocks have greater risks than equity funds?

These questions mirrored those frequently used in the literature on financial literacy related to savings and investments (Lusardi, Michaud, and Mitchell, 2017; Lusardi and Mitchell, 2014; van Rooij, Lusardi, and Alessie, 2011; Yin, Song, and Wu, 2014). Answers to the questions were used to create a composite score for financial literacy similar to what has been done in other studies where an index of financial literacy is generated. In this case, a knowledge score was created by counting how many of the three questions were answered correctly by a respondent. Scores ranged from 0 to 3.[8]

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[6] However, if a respondent had an *urban hukou* but was residing in a rural area, the respondent was classified as a non-migrant.

[7] The robustness of the results was tested using these three different definitions of financial inclusion. For more details, see the methodology and results sections of the paper.

[8] The Cronbach's alpha test and factor analysis were used to test the index even though it had only three items. The Cronbach's alpha test revealed that the index had low reliability ($\alpha = 0.3427$). However, the factor loadings using the principal component method from both varimax and promax rotations provided statistical evidence that the items were likely measuring one underlying latent concept, even though the factor loadings for two items were somewhat low. The factor loadings for all three items were 0.5979,

With regard to each respondent's financial literacy experience, respondents were asked: "Have you ever taken an economic or financial course before?" Answers were coded dichotomously. In terms of information search, respondents were asked: "To what degree do you pay attention to economic and financial information?" Responses were based on a 5-point Likert-type scale, ranging from 1 = "pay extreme attention to" to 5 = "pay no attention to." Other researchers have used similar types of questions to inquire about households' sources of information and where household members go to find financial information (Lyons, Chang, and Scherpf, 2006; Lyons and Scherpf, 2004). However, few studies have asked households about their informational search habits in terms of how often someone pays attention to the information (Lyons, Grable, and Zeng, 2017).[9]

3.3 Social and Infrastructural Dimensions

Besides financial literacy, the *CHFS* also includes data on other factors related to financial inclusion. These data comprise information related to a household's social infrastructure. It is known that social infrastructure can have an impact on financial decisions in several ways, especially in relation to the usage of bank and nonbank loans. There is growing evidence in the behavioral economics and finance literature that social networks (i.e., familial, peer, and community networks) can influence financial behavior via the knowledge and experience that network members impart (Amuedo-Dorantes and Mundra, 2007; Bongomin et al., 2017; Lakey, 2013; Li, 2006; Liang and Yuan, 2013; Lyons, Grable, and Zeng, 2017; Thaler and Sunstein, 2008). For example, networks may "nudge" a group member to make a financial decision based on what that member and others in the network have done in the past. For instance, did those in the network go to a local bank to apply for a loan? Did they have a good experience? Do they trust the bank? Additionally, the strength of a network can serve as a type of financial or social insurance. On the one hand, if individuals have stronger local networks, they might be more willing to take out loans because they have others to rely on if something negative should happen and they are unable to repay the loan. On the other hand, if they have a strong network, they may be more likely to rely on their informal network to meet borrowing needs rather than a formal financial institution.

The following information was used to account for this social dimension. In the *CHFS*, respondents were asked: "How important to you is family?" Responses were based on a 5-point Likert-type scale, ranging from 1 = "very important" to 5 = "very unimportant." Information was also collected on respondents' local familial network and how many blood relatives were living in their city or village. Responses ranged from zero to more than six. The survey also asked respondents about the strength of the relationships in their overall network (often referred to in Chinese as *guanxi* 关系). In the survey, respondents were asked to report the amount of money (i.e., "guanxi income") they had received from people other than family members with whom they were living.[10]

0.6458, and 0.7315. In the end, the decision was made to group the knowledge items together as an index to maintain consistency with the previous literature.

[9] The Cronbach's alpha test and factor analysis were also used to test an index that included all the financial literacy items (i.e., the three financial knowledge items, the financial course item, and the information search item). The test results were somewhat weak and suggested that the knowledge, course, and information items were likely capturing three different dimensions of financial literacy and should not be grouped together as a single index.

[10] Note that because "guanxi income" was included in the models, this income was subtracted from total household income, which was also included in the models.

A respondent may have received this money for festivals, weddings, funerals, education, medical services, living expenses, or other reasons.

Previous research has also considered the role that financial infrastructure plays in shaping an individual's ability to access and use financial services and products (e.g., number of bank branches, distance to bank branch, number of ATMs, points of service, etc.). Recently, researchers have started to recognize the growing importance of other types of infrastructure, including physical, technological, and informational (Lyons, Grable, and Zeng, 2017). The *CHFS* includes community-level data that can be used to construct a general measure of the overall quality of a community/village's infrastructure along five dimensions: (1) the cleanliness of the roads, (2) condition of the building structures, (3) level of crowding, (4) level of environmental friendliness, and (5) economic conditions. Community/village leaders were asked to rank each dimension on a scale from 1 to 10; higher scores indicated better conditions. This information was used to create an infrastructure index by summing the scores across the five dimensions. Scores ranged from 5 to 50 and followed a normal distribution.[11]

To account for industry constraints on the supply side, such as quality and actual availability of financial services, an additional measure that controlled for a respondent's access to bank loans was included in the study. Respondents who reported that they had applied for a bank loan but were denied or needed a bank loan but had not yet applied were classified as having "limited access to bank loans." In lieu of the recent digital finance movement (Klapper and Singer, 2014; Lyons, Song, and Wu, forthcoming; Manyika et al., 2016; Shrader and Duflos, 2014; Villasenor, West, and Lewis, 2016), another measure was included to account for technology access and usage. In this case, the item was whether a respondent reported using a mobile/cellular phone. Responses were coded dichotomously.

4. DESCRIPTIVE STATISTICS

Table 1 shows the descriptive statistics for those groups classified as financially excluded: rural, illiterate, and migrant households. In terms of the entire sample, 39.9% were found to be living in rural areas, 35.1% were illiterate, and 5.7% were migrants. Further, of those living in rural areas, over half were illiterate (55.8%), compared to only 21.4% of those living in urban areas. In terms of literacy, almost two-thirds of illiterate respondents were living in rural areas (63.3%), compared to only 27.1% of those who were literate. About 4.0% of illiterate respondents and 7.0% of literate respondents were migrants. When looking at the population of migrants, only 22.4% were identified as being illiterate.

In terms of financial inclusion, 11.7% of households had some type of bank loan for purposes related to home, business, agriculture, or education. Among those who reported having a bank loan, most reported that the loan was used to fund the purchase of a home (61.3%). Home loans were the most common type of loan held by migrants (83.1%) and illiterate populations (40.7%) who reported having a formal bank loan. Those living in rural areas with bank loans also tended to use loans to purchase a home; however, these respondents were more likely to use loans for agricultural purposes (35.6% compared to 44.7%, respectively). With regard to the informal sector, 26.2% of households reported having some type of non-bank loan. Of those with non-

[11] Factor analysis using the principal component method was used to test the five dimensions of the infrastructure index. The factor loadings were quite strong, indicating that the five items were measuring a single underlying latent variable, which was termed infrastructure. The results from the Cronbach's alpha test for reliability were strong ($\alpha = 0.87$).

bank loans, 67.9% indicated they had home loans. This was the most common type of loan held by households regardless of the group. However, rural and illiterate respondents with non-bank loans were more likely to report having an agricultural loan, whereas migrants with non-bank loans were more likely to report having a business loan. This finding was also true for bank loans.

Table 1 also provides information on the key dimensions of financial literacy. In general, few respondents reported having previously taken a financial course (only 7.3%). Urban and literate populations reported the highest percentages (10.8% for both categories). Knowledge about interest rates, inflation, and investment risk was also highest among urban and literate populations. Those living in rural areas, and those categorized as illiterate, exhibited the lowest knowledge scores. Interestingly, scores for migrants were higher than scores for non-migrants. This outcome may be the result of needing to know about the relative financial opportunities and threats in the economy before making the decision to migrate from rural to more urbanized areas in the PRC where a household may not be able to access certain resources because of their *hukou*. Overall, respondents were somewhat blasé about paying attention to financial information. Most indicated paying little or no attention to financial information, with rural and illiterate populations paying less attention than urban and literate populations. The one exception was among migrants, who were more likely than non-migrants to pay a bit more attention to financial information.

Regardless of their status, the majority of respondents indicated that family was important in their life. More than one-third of respondents reported having a local family network greater than six persons. Unsurprisingly, migrants were less likely to report having a large family network locally. Guanxi income was highest among those living in urban areas and lowest among those residing in rural areas. Across classifications, there was very little difference in levels of infrastructure and access to mobile technology. In terms of perceived access to the formal financial markets, 14.6% of the sample, on average, believed that they had limited access to formal bank loans; 21% and 19% of those living in rural areas and those who were classified as illiterate, respectively, reported having limited bank loan access.

As one might expect, large differences between those living in rural and urban areas and those who were illiterate and not illiterate were noted in respect to income and wealth. Rural and illiterate respondents held less wealth and earned less income. Across the sample, respondents exhibited below-average to no financial risk tolerance. Given their status, it was not surprising that migrants reported holding a slightly higher risk tolerance.

Demographically, those living in urban centers were better educated and in better health. Those living in rural areas tended to be male, married, less educated, and in relatively poorer health. The situation among illiterate respondents was more pronounced. They were less well physically. Migrants tended to be the healthiest, although this population also had the smallest family size. Rural households were slightly more likely to report having children and larger family sizes, including more elders living in the household. While few respondents were self-employed, migrants were noticeably more likely to report being self-employed.

Finally, the sample was geographically diverse. Slightly more than one in four respondents lived in the eastern region of the PRC, although among migrants, the percentage was closer to 40%. Fewer respondents reported living in the southern and northern regions of the PRC. Outside of the eastern region, those who were classified as illiterate were more likely to live in the southwest region, which also happens to be a more rural area of the PRC.

Table 1: Financial Literacy and Descriptive Profile of Financially Excluded Households in the PRC

Variables (percentages)	(1) All (n = 24,047)	(2) Rural (n = 7,501)	(3) Urban (n = 16,546)	(4) Illiterate (n = 7,481)	(5) Literate (n = 16,566)	(6) Migrant (n = 1,342)	(7) Non-migrant (n = 22,705)
Financially excluded populations							
Rural	39.9	100.0	0.0	63.3	27.1	0.0	42.3
Illiterate	35.1	55.8	21.4	100.0	0.0	22.4	35.9
Migrant	5.7	0.0	9.4	3.6	6.8	100.0	0.0
Financial inclusion							
Has bank loan	11.7	10.8	12.3	7.6	13.9	12.1	11.6
Bank loan: home	61.3	35.6	77.9	40.7	67.9	83.1	60.0
Bank loan: business	12.5	9.5	14.4	11.3	12.8	14.7	12.3
Bank loan: agriculture	20.0	44.7	4.0	36.1	14.8	1.0	21.1
Bank loan: education	14.0	22.4	8.6	20.9	11.8	6.7	14.4
Has non-bank loan	26.2	34.1	20.9	29.5	24.4	25.4	26.2
Non-bank loan: home	67.9	62.6	73.6	66.8	68.6	70.9	67.7
Non-bank loan: business	11.3	6.4	16.7	6.9	14.2	26.5	10.5
Non-bank loan: agriculture	21.6	35.4	6.6	28.4	17.1	3.2	22.6
Non-bank loan: education	19.9	23.0	16.6	21.5	18.9	12.8	20.3
Financial literacy dimensions							
Financial course	7.3	1.9	10.8	0.8	10.8	7.3	7.3
Financial knowledge	0.65	0.43	0.79	0.34	0.82	0.76	0.64
Interest rates	22.1	16.5	25.8	12.2	27.4	25.9	21.8
Inflation	15.7	15.3	15.9	12.9	17.2	15.3	15.7
Investment risk	27.5	11.7	38.1	9.2	37.5	35.3	27.1
Fin info: Pay extreme attention	4.2	4.0	4.4	2.6	5.1	3.0	4.3
Fin info: Pay a lot of attention	7.9	7.2	8.3	4.9	9.5	5.2	8.0
Fin info: Pay general attention	24.4	19.0	28.0	14.6	29.7	25.4	24.3
Fin info: Pay a little attention	26.5	23.7	28.5	21.2	29.5	36.3	26.0
Fin info: Pay no attention	37.0	46.1	30.9	56.8	26.2	30.0	37.4
Other financial inclusion dimensions							
Family very important	65.5	61.2	68.3	58.7	69.1	70.8	65.1
Local family network > 6	39.1	36.6	40.8	35.6	41.0	16.9	40.4
Guanxi income (RMB)	2,214.0	1,473.5	2,704.8	1,579.9	2,557.7	2,218.9	2,213.7
Infrastructure index (#)	27.3	26.7	27.7	26.0	28.0	26.0	27.4
Limited access to bank loans	14.6	21.1	10.2	18.7	12.3	11.1	14.8
Access to mobile technology	89.2	86.9	90.8	81.4	93.5	95.0	88.9
Household income and wealth							
Wealth (RMB)	696,670.5	269,121.9	980,040.3	304,297.1	909,324.1	556,223.2	705,117.2
Income (RMB)	60,823.8	36,342.9	77,049.3	35,244.6	74,687.0	57,235.6	61,039.6
Homeowner	63.6	63.2	63.9	62.3	64.4	58.6	63.9
Risk: High risk, high return	6.3	6.7	6.1	5.2	6.9	7.5	6.2
Risk: Slightly above-average risk, slightly above-average return	4.8	2.8	6.1	2.1	6.2	8.7	4.5
Risk: Average risk, average return	20.4	16.9	22.7	12.6	24.7	30.0	19.8
Risk: Slightly below-average risk, slightly below-average return	15.3	13.7	16.3	11.6	17.3	17.0	15.2
Risk: Unwilling to take any risk	53.2	59.9	48.8	68.5	45.0	36.7	54.2

continued on next page

Table 1 *continued*

Variables (percentages)	(1) All (n = 24,047)	(2) Rural (n = 7,501)	(3) Urban (n = 16,546)	(4) Illiterate (n = 7,481)	(5) Literate (n = 16,566)	(6) Migrant (n = 1,342)	(7) Non-migrant (n = 22,705)
Individual demographics							
Age (#)	50.7	53.2	49.0	57.2	47.2	36.0	51.6
Educ: No school	9.6	16.0	5.4	27.4	0.0	4.0	10.0
Educ: Primary school	25.5	39.8	16.1	72.6	0.0	18.4	26.0
Educ: Junior high	32.0	33.5	31.0	0.0	49.3	42.0	31.4
Educ: High school	12.9	7.7	16.3	0.0	19.9	13.4	12.9
Educ: Some college	12.4	2.6	18.9	0.0	19.2	15.6	12.2
Educ: College	7.5	0.3	12.3	0.0	11.6	6.5	7.6
Female	41.9	33.3	47.6	45.5	40.0	46.1	41.7
Married	84.6	88.6	82.0	82.8	85.6	74.6	85.2
Poor health	28.0	39.9	20.2	43.7	19.6	10.5	29.1
Has private insurance	17.3	10.8	21.6	8.2	22.2	20.2	17.1
Family size (#)	2.1	2.3	1.9	2.1	2.1	1.8	2.1
Has children	42.6	46.7	39.9	41.9	43.0	53.0	42.0
Has elders	29.1	33.2	26.4	40.1	23.1	5.4	30.5
Number employed (#)	1.9	2.4	1.5	2.0	1.8	1.9	1.9
Self-employed	8.9	4.3	12.0	4.4	11.4	27.5	7.8
Retired	14.6	2.5	22.6	9.9	17.1	0.7	15.4
Regions							
Region1: East	27.4	25.6	28.7	28.4	26.9	40.1	26.7
Region2: North	13.0	10.9	14.4	9.7	14.8	10.8	13.2
Region3: Central	14.0	15.2	13.2	13.4	14.3	13.5	14.0
Region4: South	9.5	8.3	10.2	7.7	10.4	8.3	9.5
Region5: Southwest	15.5	18.0	13.9	20.7	12.7	17.1	15.4
Region6: Northwest	9.9	11.6	8.8	11.6	9.0	7.0	10.1
Region7: Northeast	10.6	10.4	10.8	8.5	11.8	3.2	11.1

Note: All statistics were weighted and are reported as percentages unless otherwise indicated. Dollar values are in RMB. As of August 14, 2017, 1 RMB = 0.15 USD.

Table 2a presents the characteristics of financially excluded households based on their usage of *bank loans.* In general, those with bank loans were more financially literate than those who reported having no bank loans. They also had stronger social networks, lived in communities with better infrastructure, and were more likely to have access to mobile technology. Across all the categories, among those who reported having a bank loan, less than 20% had ever taken a financial course. This was highest among those categorized as literate (17.1%) and lowest among those categorized as illiterate (1.4%). Those living in rural areas and the illiterate once again had the lowest levels of financial knowledge. Overall, those with a bank loan were more likely to report paying only general attention or little to no attention to financial information. Even so, a surprising number noted paying no attention to financial information, with more than one out of three rural respondents (36.2%) and approximately 45% of illiterate respondents paying no attention to financial information. Similar to what was reported earlier, the majority of respondents, across categories, reported that family was very important as a dimension of financial inclusion. Between 20% and 43% of those with a bank loan had a local family network of six or more people. Migrants reported having the fewest number of family members living in the area. Guanxi income was highest among those living in urban areas. The infrastructure index was relatively consistent across categories. As expected with this group, less than 12% reported having limited access to bank loans, whereas most had access to mobile technology (94.2%). Almost

82% of those with a bank loan were homeowners. This is not surprising because data showed that a larger portion of loans were used to purchase real estate. As was the case with the larger sample, those with the lowest wealth and income tended to live in rural areas and be classified as illiterate.

Table 2b provides data on financially excluded households based on their usage of *non-bank loans.* For the sample as a whole, those without a non-bank loan were more likely than those with a non-bank loan to be financially literate. In addition, they were considerably less likely to report having limited access to formal bank loans and mobile technology. Compared to those in Table 2a who reported having a bank loan, those with a non-bank loan in Table 2b were less likely to have taken a financial course. Financial knowledge levels were also generally lower compared to those with bank loans. Across all categories, those who had a non-bank loan were about equally likely as those with a bank loan to report paying little or no attention to financial information. Comparing those with and without non-bank loans, the findings related to the importance of family, the size of one's local family network, and the level of infrastructure in one's community were similar across categories. An exception was that migrant respondents with non-bank loans were more likely to have larger local family networks than migrants without non-bank loans. Compared to those in Table 2a with bank loans, those with non-bank loans in Table 2b were somewhat less likely to report that family was important, less likely to have a large local network of family members, more likely to live in a community with poorer infrastructure, and more likely to report limited access to formal bank loans and mobile technologies. Compared to those with bank loans, those with non-bank loans were about equally likely to be homeowners (81.9% compared to 80.8%); however, they reported considerably lower levels of income and wealth across all categories. Similar to the data shown in Table 2a, those living in rural areas and those classified as illiterate reported the lowest levels of income and wealth.

Overall, the descriptive findings presented in this section were used to hypothesize that a positive relationship was likely to exist between financial literacy and households' usage of bank loans, while a negative relationship was likely to exist for non-bank loans. Further, the data indicated that households' usage of bank loans was likely to vary according to the definition of financial literacy and households' likelihood of financial exclusion. There was also statistical evidence to suggest that social and infrastructural dimensions likely matter as well. The next step in the study was to determine whether the empirical results, holding other factors constant, supported the descriptive findings.

Table 2a: Financial Literacy Profile of Financially Excluded Households Based on Usage of Bank Loans

	Has Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
Variables (percentages)	n = 3,270	n = 1,029	n = 2,241	n = 683	n = 2,587	n = 178	n = 3,092
Financial literacy dimensions							
Financial course	13.3	4.0	19.3	1.4	17.1	6.9	13.7
Financial knowledge	0.82	0.55	1.00	0.47	0.94	0.91	0.82
Fin info: Pay extreme attention	7.5	7.5	7.5	4.7	8.4	4.1	7.7
Fin info: Pay a lot of attention	11.9	11.5	12.1	9.3	12.7	6.7	12.2
Fin info: Pay general attention	29.3	24.5	32.4	21.0	32.0	25.7	29.5
Fin info: Pay a little attention	25.1	20.2	28.4	19.6	26.9	40.1	24.3
Fin info: Pay no attention	26.2	36.2	19.7	45.3	20.0	23.4	26.3
Other fin inclusion dimensions							
Family very important	72.4	68.3	75.0	66.8	74.2	78.0	72.0
Local family network > 6	40.4	43.1	38.6	39.9	40.5	20.8	41.5
Guanxi income (RMB)	3,318.9	1,571.6	4,447.9	2,553.7	3,565.8	3,497.4	3,308.4
Infrastructure index (#)	28.6	27.2	29.5	26.6	29.3	27.9	28.7
Limited access to bank loans	11.1	16.5	7.6	14.5	10.0	5.3	11.5
Access to mobile technology	94.2	93.4	94.7	88.7	96.0	96.5	94.0
Household income and wealth							
Homeowner	81.9	76.0	85.7	78.2	83.1	83.2	81.8
Wealth (RMB)	1,119,580.2	398,331.9	1,585,640.9	442,542.6	1,338,072.8	1,091,134.2	1,12,429.3
Household income (RMB)	101,931.2	55,429.3	131,980.0	49,699.5	118,787.3	105,166.9	101,742.0
	Does Not Have Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
	n = 20,777	n = 6,472	n = 14,305	n = 6,798	n = 13,979	n = 1,164	n = 19,613
Financial literacy dimensions							
Financial course	6.4	1.6	9.5	0.7	9.7	7.4	6.3
Financial knowledge	0.62	0.42	0.76	0.33	0.79	0.74	0.62
Fin info: Pay extreme attention	3.7	3.5	3.9	2.3	4.5	2.9	3.8
Fin info: Pay a lot of attention	7.3	6.6	7.7	4.5	8.9	5.0	7.4
Fin info: Pay general attention	23.7	18.2	27.3	13.9	29.2	25.4	23.5
Fin info: Pay a little attention	26.8	24.2	28.5	21.3	29.9	35.8	26.2
Fin info: Pay no attention	38.6	47.6	32.6	57.9	27.5	30.9	39.0
Other fin inclusion dimensions							
Family very important	64.4	60.2	67.2	57.9	68.2	69.7	64.1
Local family network > 6	38.9	35.6	41.1	35.1	41.1	16.3	40.3
Guanxi income (RMB)	2,047.6	1,459.0	2,439.2	1,482.6	2,376.1	2,032.1	2,048.5
Infrastructure index (#)	27.1	26.6	27.4	26.0	27.7	25.7	27.2
Limited access to bank loans	15.1	21.8	10.6	19.1	12.9	12.0	15.3
Access to mobile technology	88.5	85.9	90.2	80.7	93.0	94.8	88.1
Household income and wealth							
Homeowners	60.9	61.3	60.6	60.7	61.1	55.0	61.2
Wealth (RMB)	632,959.3	249,996.3	887,747.1	290,476.9	832,098.5	478,081.6	642,313.2
Household income (RMB)	54,631.0	33,517.7	68,677.9	33,799.5	66,743.7	50,233.6	54,896.6

Note: All statistics were weighted and are reported as percentages unless otherwise indicated. Dollar values are in RMB. As of August 14, 2017, 1 RMB = 0.15 USD.

Table 2b: Financial Literacy Profile of Financially Excluded Households Based on Usage of Non-bank Loans

	Has Non-Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
VARIABLES (percentages)	n = 6,898	n = 3,080	n = 3,818	n = 2,546	n = 4,352	n = 387	n = 6,511
Financial literacy dimensions							
Financial course	5.2	1.9	8.8	0.8	8.1	6.4	5.2
Financial knowledge	0.59	0.46	0.72	0.36	0.74	0.75	0.58
Fin info: Pay extreme attention	4.2	4.4	4.0	3.1	4.9	3.9	4.2
Fin info: Pay a lot of attention	7.4	7.3	7.7	4.9	9.1	6.4	7.5
Fin info: Pay general attention	24.4	21.1	27.9	16.1	29.8	27.9	24.2
Fin info: Pay a little attention	26.1	23.7	28.6	21.9	28.8	28.6	25.9
Fin info: Pay no attention	37.9	43.6	31.8	54.0	27.4	33.2	38.2
Other fin inclusion dimensions							
Family very important	65.8	62.4	69.6	60.8	69.1	71.1	65.5
Local family network > 6	39.6	38.4	40.8	36.0	41.9	20.7	40.6
Guanxi income (RMB)	2,060.9	1,409.9	2,767.6	1,760.4	2,257.8	2,117.0	2,278.0
Infrastructure index (#)	26.8	26.6	26.9	25.8	27.4	25.5	26.8
Limited access to bank loans	33.8	37.0	30.4	37.7	31.3	33.0	33.9
Access to mobile technology	91.8	90.7	93.0	87.7	94.4	94.7	91.6
Household income and wealth							
Homeowner	80.8	78.4	83.5	79.4	81.8	79.9	80.9
Wealth (RMB)	496,043.1	263,888.1	748,085.1	266,673.5	646,395.1	602,495.6	490,057.0
Household income (RMB)	48,497.7	33,083.0	65,232.8	32,826.4	58,770.2	48,287.7	48,509.5
	Does Not Have Non-Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
	n = 17,149	n = 4,421	n = 12,728	n = 4,935	n = 12,214	n = 955	n = 16,194
Financial literacy dimensions							
Financial course	8.1	1.9	11.4	0.7	11.8	7.6	8.2
Financial knowledge	0.68	0.42	0.81	0.33	0.85	0.76	0.67
Fin info: Pay extreme attention	4.2	3.8	4.5	2.3	5.2	2.7	4.3
Fin info: Pay a lot of attention	8.1	7.2	8.5	4.9	9.6	4.8	8.3
Fin info: Pay general attention	24.4	17.7	28.0	13.8	29.7	24.5	24.4
Fin info: Pay a little attention	26.8	23.7	28.4	20.8	29.7	39.2	26.0
Fin info: Pay no attention	36.6	47.6	30.6	58.1	25.8	28.8	37.0
Other fin inclusion dimensions							
Family very important	65.3	60.5	67.9	57.6	69.1	70.7	65.0
Local family network > 6	38.9	35.4	40.8	35.3	40.7	15.5	40.4
Guanxi income (RMB)	2,276.8	1,512.5	2,685.8	1,492.0	2,669.1	2,257.1	2,278.0
Infrastructure index (#)	27.5	26.7	28.0	26.2	28.2	26.2	27.6
Limited access to bank loans	6.7	11.4	4.1	9.4	5.3	2.9	6.9
Access to mobile technology	88.2	84.5	90.2	78.4	93.1	95.2	87.8
Household income and wealth							
Homeowner	56.6	54.0	58.0	54.0	57.9	50.6	57.0
Wealth (RMB)	778,923.6	272,325.9	1,050,037.0	322,624.7	1,006,981.3	538,857.7	793,748.2
Household income (RMB)	65,877.3	38,338.5	80,615.1	36,422.6	80,598.8	60,593.7	66,203.6

Note: All statistics were weighted and are reported as percentages unless otherwise indicated. Dollar values are in RMB. As of August 14, 2017, 1 RMB = 0.15 USD.

5. METHODOLOGY

5.1 Theoretical framework

Standard economic theory posits that individuals maximize their expected utility and make savings and borrowing decisions based on their expected lifetime resources and preferences. The theory assumes that individuals have unbounded rationality and are fully informed agents, able to predict future income and wealth and discount these factors appropriately. In reality, people do not have unbounded rationality; their capacity to process information is not unlimited. Instead, people adopt rules of practice (heuristics) to create bounds in order to process available information given their existing cognitive capacity. These heuristics can lead to systematic biases and "errors" in the decision-making process (Thaler and Sunstein, 2008). Further, other informational asymmetries can lead to additional mistakes, especially when decisions are more complex. For populations that are economically vulnerable with limited resources and limited access to information, these mistakes are likely to have greater costs and more serious financial consequences. Researchers who advocate for the usage of financial literacy interventions often argue that greater financial knowledge can reduce these costs and lead to greater financial capabilities, and thus greater ability to process information, resulting in more informed and "optimal" financial choices.

Recent studies using standard life-cycle theory assume that financial information can be accumulated. In these models, the decision of how much to invest in financial literacy is a choice that comes with costs and benefits (Jappelli and Padula, 2013; Lusardi and Mitchell, 2014; Lusardi, Michaud, and Mitchell, 2017). These models make an important assumption that investing in financial literacy increases the net returns to savings, but requires money, time, and effort. The decision to invest in financial literacy can be expressed as $f(X)$, where $f(X)$ represents the net value associated with the decision, and with X being the factors that affect the decision. Individuals will choose to accumulate financial literacy when $f(X) + \varepsilon > 0$, such that the benefits of accumulation are greater than the costs.

The empirical findings from life-cycle models typically support the hypothesis that the accumulation of financial knowledge leads to greater wealth accumulation, but the results are often based on the "average" individual. Few studies have considered the impacts of financial literacy across the wealth distribution, and most notably for those in the lower tail. Yet individuals at the bottom of the distribution, especially those in developing countries such as the PRC, often face greater uncertainty and barriers to entry in the financial markets. For these individuals, on average, it is often argued that the costs to accumulating financial literacy are much higher than the benefits that can be obtained.

Economic modeling has attempted to explain this phenomenon by incorporating uncertainty and borrowing constraints into the life-cycle framework (Lusardi, Michaud, and Mitchell, 2017). Using this framework, two opposing forces begin to emerge. On the one hand, those in the lower tail of the distribution who are constrained are likely to face greater costs to investing in financial literacy and so will choose not to invest. On the other hand, those in the lower tail also face greater uncertainty and may wish to save more and thus invest more in financial literacy for precautionary reasons. Traditional economic theory supports the notion that there are many other factors such as prices, interest rates, informational asymmetries, and noncompetitive markets that can also affect the incentives to invest in knowledge (Beck and De la Torre, 2006; Claessens, 2006). Behavioral economists would add to this list additional factors

such as cognitive limitations, behavioral biases, time inconsistencies, expectations, and issues of trust (Li, 2006; Meng, 2014; Thaler and Benartzi, 2004). The question remains, however, as to which effect dominates, especially for those groups most economically vulnerable.

The evidence from both standard economic theory and behavioral economics is still unclear. One reason is that most existing models have been tested using data from the United States and Europe. The factors driving financial literacy and financial inclusion may be different for developed versus developing countries, as well as across countries. Further, the situation may be different for countries like the PRC where there are clear historical and cultural differences in savings behavior (Fungáčová and Weill, 2015; Yuan and Jin, 2017).

These theoretical arguments provide helpful context when examining the relationship between financial literacy and inclusion for vulnerable populations in the PRC. For historical and cultural reasons, it is possible to think of many instances where individuals in the PRC who are in the lower tail of the economic distribution may still choose to accumulate financial literacy regardless of the "costs" (Yuan and Jin, 2017). Yet many vulnerable individuals may not be able to reap immediate benefits of financial literacy until barriers to access are removed. In the case of the PRC, financial literacy may not lead to a greater likelihood of borrowing among economically vulnerable populations. However, it is reasonable to expect financial literacy to lead to a higher probability of borrowing for those facing relatively fewer barriers when accessing financial services (i.e., urban, literate, and non-migrant populations).

For this study, cross-sectional data were used. Further, it was assumed that respondents were endowed with a certain level of financial literacy that they had already accumulated prior to the decision of whether to borrow. Thus, the measures of financial literacy were assumed to be exogenous.[12]

5.2 Empirical Models

Probit models were estimated to empirically investigate the impacts of financial literacy on households' financial inclusion, in this case, usage of both bank and non-bank loans. The relationship was assumed to be as follows:

$$L_{ijk}^{*} = \beta_0 + FinLiteracy_{ijk}'\beta_1 + X_{ijk}'\beta_2 + \varepsilon_{ijk}, \quad (1)$$

where L_{ijk}*=1 iff* $L_{ijk}^{*} > 0$ *and 0 otherwise for* $i=\{1, \ldots, I\}$, $j=\{1, \ldots, J\}$, *and* $k=\{1, \ldots, K\}$.

In this model, L_{ijk} is the continuous, latent random variable that represents the actual amount of loans held by the i^{th} household in the j^{th} community for the k^{th} bank or non-bank loan. L_{ijk}^{*} is unobservable. However, the discrete dependent variable L_{ijk} is observable such that it is equal to 1 if the i^{th} respondent in the j^{th} community has a k^{th} bank or non-bank loan, and 0 otherwise. The error terms, ε_{ijk}, are assumed to be distributed standard normally with mean 0 and variance equal to 1.

The factors that determine L_{ijk}^{*}, and thus L_{ijk}, are represented by the vector, $FinLiteracy_{ijk}$, that includes the variables that control for financial literacy along the three dimensions described in the data section. The vector, X_{ijk}, is also included in the model. This vector controls for the social and infrastructural dimensions of financial inclusion that can affect loan usage. Additional factors are included to control for the following

[12] For further discussion on the issue of financial literacy and the assumption of exogeneity, see the conclusions section of this paper as well as Lyons, Song, and Wu (forthcoming).

individual and household-level characteristics: wealth, income, homeownership, risk tolerance, age, gender, marital status, health status and insurance coverage, family size, family structure (i.e., children and elders present in the home), employment status (i.e., number employed, self-employed, retired), and regional location.

Probit models were first estimated for all households, controlling for the three vulnerable populations of interest: rural, illiterate, and migrant respondents. The models were then estimated separately for each of the target populations to determine how the impact of financial literacy on usage of bank and non-bank loans varied across the populations. Specifically, the models were estimated for rural and urban, illiterate and literate, and migrant and non-migrant households. As a robustness check, three additional models were estimated to test whether the financial literacy results were consistent depending on the type of loans held by the household. The first model included loans held by the household for purposes related to home, business, agriculture, and/or education. The second model included home, business, and agricultural loans. In the PRC, the home represents the most important asset in a household's portfolio. Debt related to the home is also by far the most common type of debt held by Chinese households. For this reason, the final model included home loans only, to test whether home loans were driving the results.

6. RESULTS

6.1 Relationship between Financial Literacy and Usage of Bank Loans

Table 3 presents the marginal effects and standard errors for the probit models that examined the impact of financial literacy on the *probability of having a bank loan*. The first column presents the results for all households, controlling for the financially excluded target populations (i.e., rural, illiterate, and migrant households). The remaining columns present the results for rural, illiterate, and migrant households and their respective comparison groups.

With regard to the model for all households, the results show that taking a financial course and paying more attention to financial information significantly increased the probability of having a bank loan. Respondents who took a course were 3.0 percentage points more likely to have a bank loan compared to those who had not taken a course. Those who reported "paying extreme attention" or "paying a lot of attention" to financial information were 6.0 and 4.4 percentage points, respectively, more likely to have a bank loan compared to those who reported "paying no attention" to financial information. The knowledge-based measure of financial literacy was found to be insignificant. Recall, though, that this measure was based on questions that were testing numeracy and concepts related to interest, inflation, and investment risk and not cash flow or debt management, which could be more relevant when looking at borrowing behavior.

Table 3: Impact of Financial Literacy on Probability of Having Bank Loans for Financially Excluded Households

	Probit Models for Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
Financial literacy indicators							
Financial course	0.0302***	0.0506*	0.0228***	0.0507	0.0347***	–0.0091	0.0341***
	(0.0088)	(0.0297)	(0.0085)	(0.0377)	(0.0103)	(0.0322)	(0.0092)
Financial knowledge	0.0033	–0.0041	0.0049	0.0044	0.0024	0.0097	0.0026
	(0.0028)	(0.0052)	(0.0032)	(0.0047)	(0.0036)	(0.0113)	(0.0029)
Fin info: Pay extreme attention	0.0599***	0.0471**	0.0642***	0.0404*	0.0692***	0.0212	0.0602***
	(0.0140)	(0.0217)	(0.0172)	(0.0218)	(0.0183)	(0.0604)	(0.0142)
Fin info: Pay a lot of attention	0.0436***	0.0397**	0.0393***	0.0382**	0.0439***	0.0140	0.0438***
	(0.0114)	(0.0175)	(0.0141)	(0.0184)	(0.0143)	(0.0441)	(0.0116)
Fin info: Pay general attention	0.0162**	0.0211*	0.0130	0.0248**	0.0119	0.0083	0.0171***
	(0.0064)	(0.0109)	(0.0079)	(0.0099)	(0.0085)	(0.0283)	(0.0066)
Fin info: Pay a little attention	0.0027	–0.0150*	0.0104	–0.0043	0.0043	0.0176	0.0018
	(0.0063)	(0.0091)	(0.0082)	(0.0086)	(0.0085)	(0.0257)	(0.0064)
Other financial inclusion dimensions							
Family very important	0.0138***	0.0140*	0.0113**	0.0136**	0.0127**	0.0397**	0.0122***
	(0.0045)	(0.0073)	(0.0055)	(0.0060)	(0.0063)	(0.0160)	(0.0047)
Local family network > 6	–0.0122***	0.0048	–0.0222***	–0.0014	–0.0196***	–0.0078	–0.0130***
	(0.0044)	(0.0075)	(0.0052)	(0.0064)	(0.0058)	(0.0211)	(0.0045)
Guanxi income (100,000 RMB)	0.0371***	0.0361	0.0342***	0.0501***	0.0331*	0.0739	0.0360***
	(0.0131)	(0.0557)	(0.0127)	(0.0176)	(0.0173)	(0.1013)	(0.0132)
Infrastructure index	0.0018***	0.0011*	0.0022***	0.0010**	0.0022***	0.0032***	0.0017***
	(0.0003)	(0.0006)	(0.0003)	(0.0005)	(0.0004)	(0.0011)	(0.0003)
Limited access to bank loans	–0.0559***	–0.0531***	–0.0547***	–0.0443***	–0.0606***	–0.0856***	–0.0543***
	(0.0044)	(0.0070)	(0.0054)	(0.0052)	(0.0066)	(0.0134)	(0.0046)
Access to mobile technology	0.0028	0.0222**	–0.0148	–0.0069	0.0160	0.0041	0.0021
	(0.0099)	(0.0110)	(0.0156)	(0.0131)	(0.0116)	(0.0345)	(0.0102)
Household income and wealth							
Wealth (100,000 RMB)	0.0003**	0.0019***	0.0002	0.0011***	0.0002	0.0014**	0.0003**
	(0.0001)	(0.0006)	(0.0001)	(0.0003)	(0.0001)	(0.0007)	(0.0001)
HH income (100,000 RMB)	0.0045***	0.0063	0.0037***	0.0019	0.0068***	0.0053	0.0044***
	(0.0012)	(0.0051)	(0.0013)	(0.0012)	(0.0018)	(0.0050)	(0.0012)
Homeowner	0.0895***	0.0600***	0.1047***	0.0463***	0.1136***	0.1199***	0.0871***
	(0.0043)	(0.0077)	(0.0050)	(0.0062)	(0.0057)	(0.0192)	(0.0044)
Risk: High risk, high return	0.0302***	0.0564***	0.0090	0.0359**	0.0273**	0.0444	0.0307***
	(0.0102)	(0.0178)	(0.0109)	(0.0157)	(0.0132)	(0.0412)	(0.0105)
Risk: Slightly above-average risk,	0.0186*	0.0405*	0.0121	0.0098	0.0250*	–0.0089	0.0230**
slightly above-average return	(0.0105)	(0.0239)	(0.0114)	(0.0194)	(0.0135)	(0.0334)	(0.0112)
Risk: Average risk, average return	0.0270***	0.0173	0.0294***	0.0191*	0.0331***	0.0399	0.0268***
	(0.0065)	(0.0107)	(0.0079)	(0.0103)	(0.0084)	(0.0257)	(0.0067)
Risk: Slightly below-average risk,	0.0165**	0.0063	0.0209**	0.0018	0.0243**	0.0653	0.0140**
slightly below-average return	(0.0071)	(0.0113)	(0.0088)	(0.0093)	(0.0096)	(0.0429)	(0.0069)

continued on next page

Table 3 *continued*

	Probit Models for Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
Individual demographics							
Age	–0.0023***	–0.0021***	–0.0023***	–0.0019***	–0.0025***	0.0003	–0.0025***
	(0.0002)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0010)	(0.0002)
Female	–0.0056	–0.0089	–0.0037	–0.0022	–0.0076	0.0336*	–0.0080*
	(0.0045)	(0.0078)	(0.0053)	(0.0063)	(0.0061)	(0.0183)	(0.0046)
Married	0.0297***	0.0059	0.0373***	0.0055	0.0405***	0.0268	0.0281***
	(0.0061)	(0.0132)	(0.0065)	(0.0091)	(0.0083)	(0.0263)	(0.0063)
Poor health	0.0207***	0.0249***	0.0196**	0.0092	0.0328***	0.0622	0.0196***
	(0.0059)	(0.0082)	(0.0086)	(0.0061)	(0.0093)	(0.0502)	(0.0058)
Has private insurance	0.0201***	0.0009	0.0249***	0.0092	0.0233***	0.0434	0.0180***
	(0.0059)	(0.0110)	(0.0067)	(0.0105)	(0.0073)	(0.0274)	(0.0059)
Family size	0.0010	0.0047	–0.0024	0.0024	–0.0006	0.0147*	0.0000
	(0.0021)	(0.0030)	(0.0028)	(0.0025)	(0.0031)	(0.0084)	(0.0022)
Has children	–0.0013	–0.0158*	0.0082	–0.0031	–0.0001	–0.0195	–0.0004
	(0.0054)	(0.0089)	(0.0066)	(0.0072)	(0.0075)	(0.0239)	(0.0055)
Has elders	–0.0267***	–0.0185**	–0.0363***	–0.0130*	–0.0362***	0.0054	–0.0267***
	(0.0054)	(0.0083)	(0.0065)	(0.0071)	(0.0075)	(0.0397)	(0.0055)
Number employed	0.0193***	0.0191***	0.0192***	0.0140***	0.0226***	–0.0010	0.0201***
	(0.0024)	(0.0031)	(0.0035)	(0.0031)	(0.0034)	(0.0092)	(0.0024)
Self-employed	0.0530***	0.0701***	0.0469***	0.0650***	0.0551***	0.0536**	0.0511***
	(0.0094)	(0.0226)	(0.0100)	(0.0207)	(0.0113)	(0.0235)	(0.0099)
Retired	–0.0249***	–0.0393*	–0.0178*	–0.0104	–0.0349***	.	–0.0214***
	(0.0079)	(0.0213)	(0.0093)	(0.0117)	(0.0108)	.	(0.0081)
Regions	–0.0249***	–0.0393*	–0.0178*	–0.0104	–0.0349***		
Region1: East	–0.0453***	–0.0914***	0.0053	–0.0615***	–0.0299***	–0.0068	–0.0448***
	(0.0070)	(0.0092)	(0.0098)	(0.0078)	(0.0101)	(0.0416)	(0.0071)
Region2: North	–0.0314***	–0.0731***	0.0188*	–0.0479***	–0.0146	0.0366	–0.0332***
	(0.0070)	(0.0082)	(0.0107)	(0.0065)	(0.0106)	(0.0543)	(0.0070)
Region3: Central	–0.0478***	–0.0941***	0.0070	–0.0619***	–0.0295***	0.0268	–0.0501***
	(0.0071)	(0.0079)	(0.0121)	(0.0062)	(0.0114)	(0.0505)	(0.0072)
Region4: South	–0.0422***	–0.0807***	0.0070	–0.0510***	–0.0291***	–0.0295	–0.0418***
	(0.0071)	(0.0075)	(0.0118)	(0.0062)	(0.0111)	(0.0394)	(0.0073)
Region5: Southwest	0.0121	–0.0359***	0.0691***	–0.0263***	0.0435***	0.0222	0.0134
	(0.0090)	(0.0109)	(0.0139)	(0.0087)	(0.0136)	(0.0483)	(0.0092)
Region6: Northwest	0.0042	–0.0092	0.0170	–0.0181*	0.0157	0.0141	0.0050
	(0.0094)	(0.0132)	(0.0123)	(0.0096)	(0.0136)	(0.0524)	(0.0096)
Financially excluded populations							
Rural	0.0156***	.	.	0.0180**	0.0138*	.	0.0153**
	(0.0059)	.	.	(0.0083)	(0.0080)	.	(0.0059)
Illiterate	–0.0169***	–0.0198**	–0.0144*	.	.	–0.0112	–0.0171***
	(0.0058)	(0.0085)	(0.0081)	.	.	(0.0237)	(0.0060)
Migrant	–0.0317***	.	–0.0371***	–0.0110	–0.0426***	.	.
	(0.0082)	.	(0.0077)	(0.0139)	(0.0105)	.	.
Observations	24,047	7,501	16,546	7,481	16,566	1,333	22,705
Pseudo R2	0.132	0.124	0.161	0.143	0.125	0.156	0.135

Note: All probits were weighted. Marginal effects are reported for each model. Robust standard errors in parentheses. Omitted categories include: Fin info: Pay no attention; Risk: Unwilling to take any risk; Region7: Northeast. All dollar values are in 100,000 RMB. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 3 also shows that social and infrastructural factors were significantly associated with households' usage of bank loans. Respondents who reported that family was "very important" were more likely to have a bank loan, as were those who reported higher levels of guanxi income. Those who reported a local family network of more than six were less likely to have a bank loan. With regard to infrastructure, respondents living in communities/villages with better physical infrastructure were significantly more likely to have a bank loan. Not surprisingly, those who reported more limited access to bank loans were less likely to have a loan. In terms of technology, having access to a mobile phone did not significantly affect loan usage.

Other socioeconomic factors that significantly increased a respondent's probability of having a bank loan included the following: higher levels of income and wealth, owning a home, being more risk tolerant, being married, having poor health, having any type of private insurance, and being self-employed. Those who were older, had elders present in the home, and were retired were less likely. The effect of gender was found to be negative but insignificant.

The control variables for all three target populations were statistically significant. Illiterate and migrant respondents were 1.7 and 3.2 percentage points, respectively, less likely to have a bank loan, while rural respondents were 1.6 percentage points more likely. The results were particularly interesting when the models were estimated separately for rural, illiterate, and migrant households and then compared to urban, literate, and non-migrant households. In particular, those groups traditionally excluded (i.e., rural, illiterate, and migrant households) were significantly less likely to be affected by financial literacy in the context of usage of formal bank loans. The findings for urban, literate, and non-migrant households were highly significant and similar to those found for all households. Thus, the financial literacy results for all households appear to be driven by those populations more likely to be financially included rather than excluded.

The social and infrastructural factors also tended to be less significant for the financially excluded groups. However, for all groups, the importance of family and the overall infrastructure of the community/village increased a household's likelihood of having a loan, while having limited access to bank loans decreased the probability. Given recent efforts in the PRC to reach rural populations using mobile banking, it is worth noting that possession of a mobile phone increased the probability of having a bank loan for rural households by 2.2 percentage points compared to those living in urban areas.

6.2 Relationship between Financial Literacy and Usage of Non-bank Loans

Table 4 presents the marginal effects and standard errors for the probit models that examined the impact of financial literacy on the *probability of having a non-bank loan*. With regard to all households, the results suggest that financial literacy may lead to a decrease in non-bank loans. Specifically, those who had taken a financial course were 3.3 percentage points less likely to have a non-bank loan. Similarly, those with higher levels of financial knowledge were 1.6 percentage points less likely. In terms of the three target groups, a significant difference in usage of non-bank loans was found for rural households only, where rural households were 7.2 percentage points more likely to use a non-bank loan than urban households. No significant differences in usage of non-bank loans were found for illiterate and migrant households. Even so, when the models were estimated separately for each of these groups, financial literacy effects were again found for those groups more likely to be financially included (i.e., urban, literate, and non-migrant households). The effects were largest and most significant for non-migrant households (3.5 and 1.7 percentage points, respectively). Regardless of

how financial literacy was defined, it had little, if any, impact on the probability of non-bank loans for those groups more likely to be financially excluded (i.e., rural, illiterate, and migrant populations).

Table 4: Impact of Financial Literacy on Probability of Having Non-bank Loans for Financially Excluded Households

	Probit Models for Non-Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
Financial literacy indicators							
Financial course	–0.0330***	0.0072	–0.0232*	0.0283	–0.0241*	–0.0006	–0.0348***
	(0.0128)	(0.0481)	(0.0119)	(0.0798)	(0.0128)	(0.0548)	(0.0131)
Financial knowledge	–0.0163***	–0.0097	–0.0161***	–0.0181*	–0.0127**	–0.0001	–0.0174***
	(0.0051)	(0.0095)	(0.0055)	(0.0100)	(0.0057)	(0.0175)	(0.0053)
Fin info: Pay extreme attention	0.0149	0.0321	–0.0017	0.0586	–0.0036	0.0072	0.0132
	(0.0186)	(0.0351)	(0.0196)	(0.0417)	(0.0203)	(0.0840)	(0.0190)
Fin info: Pay a lot of attention	0.0051	–0.0093	0.0112	–0.0254	0.0105	0.0200	0.0031
	(0.0150)	(0.0273)	(0.0167)	(0.0308)	(0.0169)	(0.0873)	(0.0148)
Fin info: Pay general attention	0.0224**	0.0342*	0.0178	0.0289	0.0199*	–0.0106	0.0231**
	(0.0100)	(0.0186)	(0.0111)	(0.0193)	(0.0118)	(0.0413)	(0.0102)
Fin info: Pay a little attention	0.0010	–0.0108	0.0078	0.0082	–0.0021	–0.0757**	0.0069
	(0.0094)	(0.0164)	(0.0107)	(0.0172)	(0.0112)	(0.0355)	(0.0097)
Other financial inclusion dimensions							
Family very important	0.0081	–0.0012	0.0135	0.0132	0.0062	0.0381	0.0070
	(0.0074)	(0.0133)	(0.0082)	(0.0129)	(0.0090)	(0.0321)	(0.0075)
Local family network > 6	–0.0031	–0.0031	–0.0043	0.0003	–0.0046	0.0720*	–0.0062
	(0.0072)	(0.0134)	(0.0077)	(0.0134)	(0.0084)	(0.0403)	(0.0072)
Guanxi income (100,000 RMB)	0.0175	–0.0015	0.0212	0.1072**	–0.0101	–0.1133	0.0215
	(0.0293)	(0.1159)	(0.0246)	(0.0521)	(0.0317)	(0.1546)	(0.0290)
Infrastructure index	–0.0014***	–0.0002	–0.0016***	–0.0013	–0.0011*	0.0032	–0.0016***
	(0.0005)	(0.0010)	(0.0005)	(0.0009)	(0.0006)	(0.0020)	(0.0005)
Limited access to bank loans	0.3542***	0.3072***	0.4077***	0.3314***	0.3675***	0.5755***	0.3454***
	(0.0111)	(0.0156)	(0.0153)	(0.0170)	(0.0149)	(0.0434)	(0.0115)
Access to mobile technology	0.0283**	0.0323	0.0229	0.0310	0.0155	0.0192	0.0271**
	(0.0127)	(0.0202)	(0.0152)	(0.0194)	(0.0167)	(0.0525)	(0.0130)
Household income and wealth							
Wealth (100,000 RMB)	–0.0014**	–0.0029**	–0.0010**	–0.0029***	–0.0012**	–0.0019	–0.0014**
	(0.0006)	(0.0013)	(0.0005)	(0.0010)	(0.0005)	(0.0012)	(0.0006)
HH income (100,000 RMB)	–0.0036	–0.0109	–0.0017	–0.0039	–0.0027	0.0000	–0.0039
	(0.0025)	(0.0102)	(0.0022)	(0.0068)	(0.0026)	(0.0039)	(0.0032)
Homeowner	0.1997***	0.2267***	0.1718***	0.2221***	0.1882***	0.1960***	0.1996***
	(0.0071)	(0.0135)	(0.0077)	(0.0127)	(0.0083)	(0.0299)	(0.0072)
Risk: High risk, high return	0.0127	0.0789***	–0.0346**	0.0099	0.0141	0.0315	0.0099
	(0.0156)	(0.0273)	(0.0168)	(0.0281)	(0.0186)	(0.0721)	(0.0154)
Risk: Slightly above-average risk,	0.0117	0.0556	–0.0069	0.1106**	0.0001	0.0332	0.0097
slightly above-average return	(0.0186)	(0.0436)	(0.0181)	(0.0558)	(0.0185)	(0.0724)	(0.0188)
Risk: Average risk, average return	–0.0125	0.0072	–0.0267***	0.0059	–0.0146	–0.0848**	–0.0059
	(0.0096)	(0.0184)	(0.0100)	(0.0197)	(0.0111)	(0.0342)	(0.0100)
Risk: Slightly below-average risk,	–0.0057	0.0452**	–0.0347***	0.0207	–0.0158	–0.0890**	0.0008
slightly below-average return	(0.0101)	(0.0195)	(0.0103)	(0.0198)	(0.0116)	(0.0370)	(0.0105)

continued on next page

Table 4 *continued*

	Probit Models for Non-Bank Loans						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	All	Rural	Urban	Illiterate	Literate	Migrant	Non-migrant
Individual demographics							
Age	–0.0028***	–0.0049***	–0.0017***	–0.0059***	–0.0017***	0.0022	–0.0031***
	(0.0004)	(0.0006)	(0.0004)	(0.0006)	(0.0005)	(0.0018)	(0.0004)
Female	0.0122*	0.0172	0.0092	0.0295**	0.0044	0.0223	0.0116
	(0.0074)	(0.0143)	(0.0078)	(0.0132)	(0.0088)	(0.0308)	(0.0076)
Married	0.0475***	0.0183	0.0485***	0.0100	0.0527***	0.0486	0.0435***
	(0.0098)	(0.0214)	(0.0101)	(0.0183)	(0.0120)	(0.0398)	(0.0102)
Poor health	0.0646***	0.0944***	0.0424***	0.0700***	0.0656***	0.0722	0.0657***
	(0.0088)	(0.0139)	(0.0107)	(0.0134)	(0.0115)	(0.0595)	(0.0088)
Has private insurance	–0.0195**	–0.0243	–0.0138	–0.0052	–0.0193**	–0.0567*	–0.0177*
	(0.0089)	(0.0197)	(0.0089)	(0.0216)	(0.0096)	(0.0312)	(0.0092)
Family size	0.0164***	0.0187***	0.0104***	0.0086	0.0188***	0.0163	0.0158***
	(0.0033)	(0.0054)	(0.0039)	(0.0055)	(0.0041)	(0.0131)	(0.0034)
Has children	–0.0116	–0.0131	–0.0109	0.0039	–0.0197*	–0.0453	–0.0098
	(0.0087)	(0.0163)	(0.0093)	(0.0164)	(0.0102)	(0.0366)	(0.0089)
Has elders	–0.0373***	–0.0231	–0.0463***	0.0012	–0.0532***	–0.0696	–0.0349***
	(0.0088)	(0.0153)	(0.0098)	(0.0157)	(0.0104)	(0.0519)	(0.0089)
Number employed	0.0187***	0.0203***	0.0204***	0.0235***	0.0165***	0.0151	0.0191***
	(0.0036)	(0.0055)	(0.0047)	(0.0059)	(0.0045)	(0.0176)	(0.0037)
Self-employed	0.0560***	0.0645*	0.0414***	0.0765**	0.0502***	0.0741**	0.0516***
	(0.0135)	(0.0353)	(0.0131)	(0.0320)	(0.0146)	(0.0370)	(0.0143)
Retired	–0.0598***	–0.0796*	–0.0536***	–0.0685***	–0.0652***	–0.2180***	–0.0542***
	(0.0112)	(0.0446)	(0.0110)	(0.0221)	(0.0130)	(0.0326)	(0.0114)
Regions							
Region1: East	–0.0463***	–0.0716***	–0.0242*	–0.0668***	–0.0355**	–0.0726	–0.0454***
	(0.0126)	(0.0234)	(0.0135)	(0.0244)	(0.0143)	(0.0635)	(0.0128)
Region2: North	–0.0214	–0.0522**	–0.0010	–0.0695***	–0.0008	–0.0302	–0.0215
	(0.0131)	(0.0252)	(0.0141)	(0.0251)	(0.0150)	(0.0643)	(0.0134)
Region3: Central	–0.0039	–0.0574**	0.0318*	–0.0411	0.0152	–0.0148	–0.0044
	(0.0142)	(0.0255)	(0.0164)	(0.0268)	(0.0167)	(0.0671)	(0.0146)
Region4: South	–0.0033	–0.0547**	0.0319*	–0.0385	0.0112	–0.1224**	0.0021
	(0.0150)	(0.0265)	(0.0176)	(0.0285)	(0.0175)	(0.0520)	(0.0155)
Region5: Southwest	–0.0425***	–0.0813***	–0.0213	–0.0896***	–0.0176	–0.1199**	–0.0391***
	(0.0128)	(0.0235)	(0.0142)	(0.0235)	(0.0154)	(0.0530)	(0.0131)
Region6: Northwest	0.0129	–0.0455*	0.0504***	–0.0515*	0.0479**	0.0167	0.0126
	(0.0153)	(0.0273)	(0.0172)	(0.0271)	(0.0187)	(0.0773)	(0.0156)
Financially excluded populations							
Rural	0.0716***	.	.	0.0108	0.0992***	.	0.0745***
	(0.0095)	.	.	(0.0159)	(0.0122)	.	(0.0095)
Illiterate	0.0134	–0.0241*	0.0462***	.	.	0.0628	0.0105
	(0.0092)	(0.0144)	(0.0121)	.	.	(0.0510)	(0.0092)
Migrant	–0.0022	.	0.0023	–0.0033	–0.0025	.	.
	(0.0179)	.	(0.0160)	(0.0386)	(0.0194)	.	.
Observations	24,047	7,501	16,546	7,481	16,566	1,342	22,705
Pseudo R2	0.171	0.141	0.177	0.175	0.174	0.237	0.171

Note: All probits were weighted. Marginal effects are reported for each model. Robust standard errors in parentheses. Omitted categories include: Fin info: Pay no attention; Risk: Unwilling to take any risk; Region7: Northeast. All dollar values are in 100,000 RMB. *** p < 0.01, ** p < 0.05, * p < 0.1.

In terms of the social and infrastructural factors, Table 4 shows that familial and social networks had negligible impact on the probability of having a non-bank loan, regardless of household type and likelihood of being financially included. Those living in communities/villages with better infrastructure were significantly less likely to have a non-bank loan. These results, though, were driven by the urban, literate, and non-migrant populations. For rural, illiterate, and migrant households, infrastructure did not seem to significantly matter, nor did many of the other included variables. However, having limited access to formal bank loans increased the likelihood by 35.4 percentage points for all households. The marginal effect was particularly large for migrant populations (57.6 percentage points). Homeownership also had a large and significant effect on household usage of non-bank loans. Homeowners were 20.0 percentage points more likely than non-homeowners to have a non-bank loan. In this case, the marginal effect was largest for rural households (22.7 percentage points). Those who had access to a mobile phone were 2.8 percentage points more likely to have a non-bank loan.

6.3 Robustness Checks

The results presented in Tables 3 and 4 assume a fairly inclusive definition of loan usage, such that bank and non-bank loans were taken for purposes related to the purchase of a home, business, agriculture, and/or education. It was thought that the financial literacy results, however, might vary depending on the type of loans held by the household. As a robustness check, three models using three different definitions for loan usage were estimated and compared to the results. The first model included loans held by the household for purposes related to home, business, agriculture, and/or education. The second model excluded education loans and included home, business, and/or agricultural loans. The final model included home loans only, because it was thought that home loans could be driving the results.

Table 5 presents the findings for the financial literacy, social, and infrastructural dimensions of financial inclusion. The results for the other individual and household-level variables were controlled for in the models and are available upon request. Several findings are worth noting. First, the results for the key financial literacy variables tended to be consistent regardless of the definition of loan usage. Taking a financial course and paying more attention to financial information increased the probability of having a bank loan, whereas taking a course and having lower levels of financial knowledge tended to decrease the probability of having a non-bank loan. The effects were larger and more significant for the broader measures of loan usage. Interestingly, for bank loans, the knowledge-based measure of financial literacy was significant in Models 2 and 3, which placed more weight on home loans, but insignificant in Model 1, which included all types of loans. The largest effect was found for Model 3, which showed that being more financially knowledgeable increased the probability of having a home loan in the formal financial markets. Being more financially knowledgeable significantly decreased the probability of holding a non-bank loan for all three models. However, in this case, the largest effect was found for the most comprehensive measure of loan usage, whereas the smallest effect was found for the measure that included home loans only. Paying more attention to financial information significantly increased the probability of having a bank loan but had little impact on usage of non-bank loans.

Table 5: Robustness Checks for the Impact of Financial Literacy on Usage of Bank and Non-bank Loans According to Types of Loans Held by the Household

	Bank Loans			Non-bank Loans		
Variables	Model (1)	Model (2)	Model (3)	Model (1)	Model (2)	Model (3)
Financial literacy indicators						
Financial course	0.0302***	0.0274***	0.0294***	–0.0330***	–0.0237**	0.0043
	(0.0088)	(0.0080)	(0.0069)	(0.0128)	(0.0120)	(0.0116)
Financial knowledge	0.0033	0.0043*	0.0064***	–0.0163***	–0.0100**	–0.0073*
	(0.0028)	(0.0025)	(0.0021)	(0.0051)	(0.0048)	(0.0039)
Fin info: Pay extreme attention	0.0599***	0.0618***	0.0285***	0.0149	0.0061	–0.0026
	(0.0140)	(0.0135)	(0.0100)	(0.0186)	(0.0173)	(0.0151)
Fin info: Pay a lot of attention	0.0436***	0.0381***	0.0146*	0.0051	–0.0002	–0.0159
	(0.0114)	(0.0106)	(0.0076)	(0.0150)	(0.0142)	(0.0115)
Fin info: Pay general attention	0.0162**	0.0161***	0.0045	0.0224**	0.0189**	0.0029
	(0.0064)	(0.0058)	(0.0047)	(0.0100)	(0.0094)	(0.0081)
Fin info: Pay a little attention	0.0027	0.0019	–0.0023	0.0010	–0.0003	–0.0045
	(0.0063)	(0.0054)	(0.0044)	(0.0094)	(0.0086)	(0.0073)
Other financial inclusion dimensions						
Family very important	0.0138***	0.0120***	0.0004	0.0081	0.0006	–0.0100*
	(0.0045)	(0.0040)	(0.0034)	(0.0074)	(0.0070)	(0.0060)
Local family network > 6	–0.0122***	–0.0093**	–0.0110***	–0.0031	–0.0061	–0.0019
	(0.0044)	(0.0039)	(0.0032)	(0.0072)	(0.0067)	(0.0058)
Guanxi income (100,000 RMB)	0.0371***	0.0314***	0.0299***	0.0175	0.0209	0.0335
	(0.0131)	(0.0116)	(0.0091)	(0.0293)	(0.0269)	(0.0230)
Infrastructure index	0.0018***	0.0017***	0.0019***	–0.0014***	–0.0010**	–0.0001
	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)	(0.0004)
Limited access to bank loans	–0.0559***	–0.0565***	–0.0350***	0.3542***	0.3512***	0.2970***
	(0.0044)	(0.0037)	(0.0035)	(0.0111)	(0.0111)	(0.0105)
Access to mobile technology	0.0028	0.0065	–0.0001	0.0283**	0.0265**	0.0360***
	(0.0099)	(0.0076)	(0.0072)	(0.0127)	(0.0112)	(0.0097)
Financially excluded populations						
Rural	0.0156***	0.0114**	–0.0286***	0.0716***	0.0669***	0.0075
	(0.0059)	(0.0049)	(0.0037)	(0.0095)	(0.0086)	(0.0072)
Illiterate	–0.0169***	–0.0130**	–0.0183***	0.0134	0.0156*	0.0047
	(0.0058)	(0.0051)	(0.0041)	(0.0092)	(0.0085)	(0.0073)
Migrant	–0.0317***	–0.0243***	–0.0151**	–0.0022	0.0101	0.0072
	(0.0082)	(0.0074)	(0.0060)	(0.0179)	(0.0179)	(0.0143)
Other control variables included	YES	YES	YES	YES	YES	YES
Observations	24,047	24,047	24,047	24,047	24,047	24,047
Pseudo R2	0.154	0.132	0.123	0.171	0.191	0.098

Note: All probits were weighted. Marginal effects are reported for each model. Robust standard errors are in parentheses. Model 1 includes home, business, agriculture, and educational loans; Model 2 includes home, business, and agricultural loans; and Model 3 includes home loans only. The individual and household-level control variables were included in each regression. The omitted categories were consistent with the previous estimations. All dollar values are in 100,000 RMB. *** p < 0.01, ** p < 0.05, * p < 0.1.

With regard to other dimensions of financial inclusion, it was found that social and infrastructural effects tended to be consistent across the different measures of loan usage. The effects were again stronger for bank loans than for non-bank loans. Better infrastructure significantly increased usage of bank loans and decreased usage of non-

bank loans. Two findings, though, are particularly noteworthy. First, having access to mobile technology significantly increased the probability of having a non-bank loan regardless of how non-bank loans were defined; the effect was particularly strong for Model 3 that only included home loans. Second, for bank loans, those living in rural areas were significantly more likely to have a loan according to Models 1 and 2. However, when only home loans were taken into account, the effect was negative, suggesting that rural respondents may be facing more borrowing constraints when it comes to home loans obtained in the formal financial markets.

For the three target populations, the models were also estimated separately for bank and non-bank loans using each definition of loan usage. Not surprisingly, regardless of how loan usage was defined, the results were similar to those presented in Tables 3 and 4 for each target group.

As an additional robustness check, Tobit models were estimated to investigate the association between financial literacy and the amount of bank and non-bank loans held by the household. However, analyses were limited due to missing values, nonresponse rates, and small sample sizes. For this reason, the results are not presented in the paper, but are available upon request. In general, the financial literacy variables tended to be insignificant in the Tobit models. Overall, the findings suggest that financial literacy may matter more in terms of the decision to take out a loan than the decision of how much to borrow.

7. DISCUSSION AND CONCLUSIONS

This study used data from the *2013 China Household Finance Survey (CHFS)* to investigate the impacts of financial literacy on the decision to use formal and informal loans by households traditionally excluded from the financial markets. Overall, the findings suggest that, on average, a positive relationship is likely to exist between financial literacy and household usage of bank loans, while a negative relationship is likely to exist for non-bank loans. Further, there is evidence that financial literacy and how it is defined can have different effects depending on how financial inclusion is also defined. For example, in this paper, various definitions of loan usage were considered. While the direction of the effect of financial literacy tended to be the same regardless of the definition, the magnitude and significance varied. This finding is a reminder to researchers and policy makers that how financial literacy is defined does matter. In this case, the context in which policy incorporates financial education into existing financial inclusion efforts can potentially over- or underestimate the outcomes that can be achieved. Researchers are encouraged to consider more carefully how they define financial literacy and inclusion to develop a better understanding of the relationship between the two dimensions.

At the onset of this paper, it was noted that financial literacy may be a tool that can be used to bring economically vulnerable populations into the financial mainstream to foster greater financial inclusion. However, this study found that those groups most vulnerable (i.e., rural, illiterate, and migrant households) were less likely to be positively affected by financial literacy, especially in terms of usage of formal bank loans. Does this mean that financial literacy does not work? The answer is nuanced. Recall that a positive and significant relationship was found for less vulnerable populations (i.e., urban, literate, and non-migrant households) in relation to bank loans. This finding suggests that barriers to access for vulnerable populations may first need to be overcome so that financial literacy can be more effective. Moreover, while financial literacy was found to be an important dimension of financial inclusion, other factors,

such as those related to social networks and infrastructure, mattered as well. These other factors tended to have a more significant effect on usage of bank loans, especially for the less vulnerable groups. These findings have important implications for policy makers and international organizations that are using financial literacy as a tool to improve financial inclusion for populations traditionally excluded from the financial markets.

The concept of financial literacy—the ability to use knowledge and skills to manage, spend, save, borrow, and protect one's financial resources—has traditionally been the foundation for building lifetime financial security at the household level. This helps explain the significant investment in resources designed to increase financial knowledge through the development and dissemination of information through courses, curriculums, and seminars. It was once thought that what most people lacked was a core understanding of the tools and techniques necessary to manage household resources effectively and efficiently. A working hypothesis among researchers and policy makers has been that once knowledge is obtained, assuming the person learning the information is engaged in the course work, a significant change in behavior will be noted.

Many financial literacy programs and initiatives worldwide have been designed assuming this fundamental hypothesis. However, researchers have had a difficult time "proving" that financial literacy works (Frijns, Gilbert, and Tourani-Rad, 2014). Findings from empirical studies have not consistently confirmed the hypothesis. The findings from this study provide valuable insights into one of the reasons why course work and other knowledge accumulation strategies sometimes fail to meet expectations in changing behaviors and/or improving household outcomes (see also Lyons, Chang, and Scherpf, 2006; Lyons and Kass-Hanna, forthcoming; Lyons and Scherpf, 2004). Specifically, this study showed that financial literacy is just one element that shapes financial behavior and decision making. Among the numerous factors evaluated in this study, financial literacy was meaningful for less vulnerable populations in the context of traditional lending. In this sense, course work, teaching curriculums, and seminars seem to be somewhat effective in helping those who already have access to the mainstream financial markets understand the characteristics associated with bank loans.

However, traditional measures of financial literacy were found to be less effective for the most vulnerable populations and for those who were engaged in making non-bank borrowing decisions. Consumers living in large urban areas in the PRC, for example, may benefit more from having greater knowledge of how to access and use formal credit, because they face fewer barriers and have more alternatives available to them when borrowing money. With the appropriate information in hand, urban consumers may be better equipped to make more informed borrowing decisions. For consumers living in rural areas, the lending options (especially from formal financial institutions) are likely to be more limited. Yet there can still be value in raising their awareness about the availability of credit, how a loan works, and how formal credit can be obtained from a bank, including the loan application process (Chen and Jin, 2017). An understanding about the risks associated with informal borrowing and how to avoid frauds, financial rip-offs, and unethical lending practices is also valuable. Yet it can be extremely difficult to document the effectiveness of these types of financial literacy efforts among rural, illiterate, and migrant consumers until barriers to credit access are removed or eased. Even then, these populations may still not have the financial means to fully participate in the financial markets.

Recall also that social and informational factors were found to influence households' borrowing decisions. Of particular importance was the role of familial networks (Amuedo-Dorantes and Mundra, 2007). The literature on financial help seeking and information search shows that family members are a primary source of help when people make financial decisions (Grable and Joo, 2001, 2002). A significant potential problem is that unless family members within the network possess the knowledge and skills necessary for the decisions being faced, the help seeker may not obtain appropriate or reliable information. This creates a circular pattern where problematic financial behavior becomes the norm. In this case, financial literacy efforts may fail because the topics being taught may not address the financial needs of the specific population, but also because the information being taught may conflict with the familial networks' norms.

Considerable time and resources are being devoted to increase the financial inclusion of vulnerable populations in developing countries such as the PRC through the expansion of financial literacy programs. Based on this research, countries may want to reexamine their existing strategies to refine the ways financial literacy can be used to more effectively promote financial inclusion, especially to economically vulnerable consumers. When it comes to credit, it may be valuable to first address barriers certain populations face in terms of access to basic services and products. This can then lead to a more strategic assessment of the role of financial literacy initiatives and interventions.

The findings from this study have hinted at several policy takeaways. First, financial literacy programs should be designed for different audiences. Urban consumers may require distinct information compared to those living in rural areas. Second—and this is particularly important when an audience comprises primarily rural participants—the information provided should correspond with the norms and cultural expectations held within the community. When information is contradictory, alternatives should be given. For example, rather than show how alternative lenders are typically more expensive and predatory, which is often true, it may be more important for educators to offer alternatives when, say, bank lending is not accessible. Third, findings from this study clearly show that the infrastructure in which consumers are making decisions matters. Those living in areas with less technological infrastructure, more limited access to services and information, and inadequate buildings, roads, and sanitation may be preoccupied with meeting daily needs at the expense of making informed consumer decisions.

While the results of this study are informative, a few limitations need to be acknowledged. First, it was assumed that financial literacy was exogenous. The assumption of exogeneity is common within the literature on financial literacy. Further, the survey questions asked respondents about their "prior" or "accumulated" knowledge and experience. Still, financial literacy may be jointly related to financial inclusion such that greater financial literacy leads to greater financial inclusion, and in turn, greater financial inclusion leads to greater financial literacy, via a pathway of financial experience (Frijns, Gilbert, and Tourani-Rad, 2014). However, this is less likely to be an issue in this study, because the key outcome variables were related to borrowing decisions. It is more likely to be a concern when examining wealth and savings decisions, because persons with higher wealth receive greater benefits from investing in financial literacy (e.g., Jappelli and Padula, 2013; Lusardi and Mitchell, 2013; Lusardi, Michaud, and Mitchell, 2017). In this case, greater household financial wealth is typically described as the mechanism leading to greater acquisition of financial literacy and not household debt. Even so, it is possible that financial literacy

may be endogenous for the case of loans as well. Future research using longitudinal data will be better able to address this issue.

A second limitation may be related to the quality of the financial literacy measures. In particular, the three items used to construct the knowledge-based measure of financial literacy were primarily testing numeracy and concepts related to interest, inflation, and investment risk, not cash flow and debt management concepts. There may be concern that these measures may not be suitable for explaining loan usage behavior, especially for vulnerable populations. For the entire sample, it is worth noting that over 50.0% could not answer any of the questions correctly, while only 2.9% were able to answer all the items correctly. With this said, these were the questions available within the data set, which are also the ones most commonly used by researchers worldwide to measure financial literacy. Along these same lines, one may also be concerned that the measures used to account for social and infrastructural dimensions of financial inclusion were also somewhat limited. Again, these were constructed using the best available data from the survey. Given the significance of these variables, there is an opportunity for future research to test and assess these measures using other data sources.

A third potential limitation is that while the bank loan equations that were estimated were essentially "demand equations," they reflected both supply and demand effects and were basically reduced-form equations. In the case of formal bank loans, whether one has a loan depends as much on the bank's decision to accept a loan application as it does on an individual's decision to apply for a loan. This could explain the relatively weak findings for the effects of financial literacy for the disadvantaged populations, simply because banks may be less willing to lend to them. This could also lead to greater reluctance on the part of individuals in such groups to apply for a loan, because rejection rates are likely to be high. The key message is that although policies have been targeting the financial literacy of disadvantaged populations, this has not translated into a significant effect on formal financial access. This suggests that banks' unwillingness to lend to disadvantaged groups may be a significant factor, and that policies should be aimed at easing this constraint. Thus, the factors affecting banks' decisions to lend may need to be better taken into consideration from a modeling perspective.[13] Policy incentives can then be better developed to encourage formal financial institutions to provide financially vulnerable populations with safe and affordable credit products that help them meet long-term goals such as purchasing a home or starting a small business.

Another related point is that the models that were estimated used various definitions of loan usage. However, it was assumed that the same demand function existed for all the models. It is possible that the demand function itself may differ depending on the type of loan used and whether it is a bank or non-bank loan. Regardless of these and other limitations, the findings from this study are noteworthy. This study is among the first to examine in considerable detail the impact of financial literacy on demand for both formal and informal loans for households that have been traditionally excluded from the financial markets in the PRC.

[13] A two-stage model was considered, where the first stage was to estimate whether a respondent applied for a loan and then whether the bank approved the loan application. However, the survey did not ask all respondents whether they had applied for a loan and what were the outcomes. The survey only asked respondents who did not have any bank loans why they did not have a loan. Respondents could have responded that they needed loans but never applied or had applied for loans but were denied. For this reason, it was not possible to construct a reliable two-stage model. As a second-best alternative, our models accounted for the supply-side by including a control for "limited access to bank loans" to capture those who needed loans but had not applied and those who had applied but were rejected.

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APPENDIX A-1: VARIABLE DEFINITIONS

Variable	Definition
Financially excluded populations	
Rural	= 1 if respondent lived in a rural area
Illiterate	= 1 if respondent had "never attended school" or had only attended "primary school"
Migrant	= 1 if respondent had a rural *hukou* but was currently residing in a city/county that was in an urban area that did not match their rural *hukou*
Financial inclusion	
Has bank loan	= 1 if household had a formal bank loan for purposes related to home, business, agriculture, and/or education
Bank loan: home	= 1 if household had a bank loan for home purposes only
Bank loan: business	= 1 if household had a bank loan for business purposes only
Bank loan: agriculture	= 1 if household had a bank loan for agricultural purposes only
Bank loan: education	= 1 if household had a bank loan for education purposes only
Has non-bank loan	= 1 if household had a non-bank loan for purposes related to home, business, agriculture, and/or education (sources of non-bank loans include parents, children, siblings, other relatives, friends/colleagues, and nongovernment financial institutions)
Non-bank loan: home	= 1 if household had a non-bank loan for home purposes only
Non-bank loan: business	= 1 if household had a non-bank loan for business purposes only
Non-bank loan: agriculture	= 1 if household had a non-bank loan for agricultural purposes only
Non-bank loan: education	= 1 if household had a non-bank loan for education purposes only
Financial literacy dimensions	
Financial course	Respondents were asked: "Have you ever taken an economic or financial class before?" = 1 if respondent had taken a course
Financial knowledge	Score calculated by counting how many of the three knowledge-based questions (related to interest rates, inflation, and investment risk) were answered correctly by the respondent. Scores ranged from 0 to 3
Interest rates	Respondents were asked: "Given a 4% interest rate, how much would you have after 5 years if you have 100 RMB at first?" = 1, Correct, if respondent selected "More than 120 RMB"
Inflation	Respondents were asked: "With an interest rate of 5% and an inflation rate of 3%, after saving money in the bank for 1 year, can you buy more or less than last year?" = 1, Correct, if respondent selected "More than last year"
Investment risk	Respondents were asked: "Do you think stocks have greater risks than equity funds?" = 1, Correct, if respondent selected "Yes"
Fin info: Pay extreme attention	Respondents were asked: "In your daily life, how much attention do you pay to economic and financial information?" = 1 if respondent paid extreme attention
Fin info: Pay a lot of attention	= 1 if respondent paid a lot of attention
Fin info: Pay general attention	= 1 if respondent paid general attention
Fin info: Pay a little attention	= 1 if respondent paid a little attention
Fin info: Pay no attention	= 1 if respondent paid no attention at all

continued on next page

Appendix *table continued*

Variable	Definition
Other financial inclusion dimensions	
Family very important	Respondents were asked: "How important is family?" = 1 if the respondent reported that family was "important" or "very important"
Local family network >6	= 1 if the respondent had more than six blood relatives living in his or her city or village
Guanxi income (RMB)	Amount of money (in RMB) household received from people other than family members with whom they were living (for reasons related to festivals, weddings, funerals, education, medical services, living expenses, etc.)
Infrastructure index (#)	Community/village leaders ranked the community/village's infrastructure along five dimensions on a scale from 1 to 10: (1) cleanliness of the roads, (2) condition of the building structures, (3) level of crowding, (4) level of environmental friendliness, (5) economic conditions. Infrastructure index is the sum of the scores across the five dimensions; scores ranged from 5 to 50
Limited access to bank loans	=1 if household applied for a bank loan but was denied or needed a bank loan but had not yet applied
Access to mobile technology	=1 if respondent reported using a mobile/cellular phone
Household income and wealth	
Wealth (RMB)	Household's net worth in RMB
Income (RMB)	Household's total net income in RMB
Homeowner	= 1 if family reported owning a primary residence
Risk: High risk, high return	Respondents were asked about their preference for various combinations of risk and return. = 1 if the respondent preferred "high risk, high return"
Risk: Slightly above-average risk, slightly above-average return	= 1 if the respondent preferred "slightly above-average risk, slightly above-average return"
Risk: Average risk, average return	= 1 if the respondent preferred "average risk, average return"
Risk: Slightly below-average risk, slightly below-average return	= 1 if the respondent preferred "slightly below-average risk, slightly below-average return"
Risk: Unwilling to take any risk	= 1 if the respondent was "unwilling to take any risk"
Individual demographics	
Age (#)	Age of the respondent in years
Educ: No school	= 1 if respondent had never attended school
Educ: Primary school	= 1 if respondent had primary education
Educ: Junior high	= 1 if respondent had junior high education
Educ: High school	= 1 if respondent had high school education
Educ: Some college	= 1 if respondent had some college or vocational education
Educ: College	= 1 if respondent had a college degree or more
Female	= 1 if respondent was female
Married	= 1 if respondent was married
Poor health	= 1 if respondent reported having poor health
Has private insurance	= 1 if household had some type of commercial insurance (including life, health, pension, property, or other commercial insurance)
Family size (#)	Number of family members currently living in the home
Has children	= 1 if the household had children less than 16 years of age living in the home
Has elders	= 1 if the household had persons over 65 years of age living in the home

continued on next page

Appendix *table continued*

Variable	Definition
Number employed (#)	Number of family members currently living in the home who had a job
Self-employed	= 1 if respondent reported being self-employed
Retired	= 1 if respondent reported being retired
Regions	
Region1: East	= 1 if respondent lived in eastern region of the PRC
Region2: North	= 1 if respondent lived in northern region of the PRC
Region3: Central	= 1 if respondent lived in central region of the PRC
Region4: South	= 1 if respondent lived in southern region of the PRC
Region5: Southwest	= 1 if respondent lived in southwestern region of the PRC
Region6: Northwest	= 1 if respondent lived in northwestern region of the PRC
Region7: Northeast	= 1 if respondent lived in northeastern region of the PRC

Source: 2013 China Household Finance Survey (CHFS).